MERCURY AND TCE FATE AND TRANSPORT MODEL AREAS B AND U

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1.0 INTRODUCTION

The Federal Aviation Administration (FAA) William J. Hughes Technical Center (Technical Center), located at the Atlantic City International Airport in New Jersey (Figure 1), has been conducting Superfund Remedial Investigation/Feasibility Study/Remedial Action (RI/FS/RA) activities since the facility was named to the National Priorities List in 1990. The 5,000-acre area encompassing the Technical Center was historically owned by Atlantic City, which leased a portion of the area in the 1940s and 1950s to the U.S. Navy for the operation of the Atlantic City Naval Air Station. The lease was transferred to the FAA in 1958. In 1959, the FAA exercised an option to purchase the land from Atlantic City.

Full-scale remediation activities, involving the extraction and treatment of groundwater contaminated with chlorinated volatile organic compounds (VOCs), began in February 2009 at Area B (Figure 2), the Navy Fire Test Facility. Groundwater is extracted from the Shallow and Intermediate Cohansey Aquifers and, after treatment at the Central Treatment Plant (CTP), is discharged back to the Shallow Aquifer through a recharge bed (Figure 3) or sprinkler system along the South Branch of Absecon Creek (SBAC) in Area B (Figure 4), or is discharged to the Intermediate Cohansey Aquifer through injection wells (Figure 3). The Area B groundwater extraction wells are located along the SBAC (Figure 5). Groundwater is extracted from shallow, middle, and deep levels corresponding to monitoring well screened intervals within the unconfined and contiguous Shallow and Intermediate Cohansey Aquifers (Figures 6 and 7).

Mercury (Hg) concentrations in CTP influent and effluent increased steadily since the initiation of Area B remediation activities (Figure 8). Hg concentrations in the Area B VOC extraction wells, including the middle level and deep level screened wells, also increased. Prior to the initiation of groundwater extraction at Area B, Hg had not been detected in the Intermediate Cohansey Aquifer.

Hg contamination of the shallow sediments along the SBAC and its abandoned meanders had been previously documented as part of investigations of Area U (Figure 2) by the FAA and the U.S. Army Corps of Engineers (USACE). Geochemical dating of sediment cores and tree rings revealed that the Hg within the sediments of the SBAC and its abandoned meanders was deposited in the 1950s during Navy occupation of the Technical Center. Hg had also been detected in shallow groundwater in the vicinity of the SBAC and its abandoned meanders.

The extraction of groundwater from the Area B middle level and deep level screened remediation wells was believed to be inducing downward migration of Hg from the shallow SBAC sediments (TRC, 2010a). Sampling and analysis of Area B groundwater demonstrated that Hg concentrations are generally higher in unfiltered samples than samples that are passed through a 0.45-micron (µm) filter, indicating that Hg contamination and transport are at least partly attributable to the occurrence of Hg colloids in groundwater. Low-flow sampling and the use of finer filters confirmed that Hg also occurs as smaller colloids (between 0.0015 µm and 0.45 µm).

The belief that Area B groundwater extraction was causing Hg contamination of the Intermediate Aquifer led to the question of whether modification of the extraction rates of the various remediation wells could mitigate the Hg transport without impairing VOC capture. The importance of this mitigation effort is based upon a previous analysis of groundwater flow at the site. A site-wide groundwater model demonstrated that the Atlantic City Municipal Utilities Authority (ACMUA) production wells, located along the north side of the Upper Atlantic City Reservoir on the Technical Center property (Figure 9), generate strong downward vertical gradients and flow of groundwater from the Intermediate Cohansey Aquifer into the Deep Cohansey Aquifer, in which the ACMUA wells are completed (TRC, 2010b). Conceptually, therefore, it was believed that Hg transported from the shallow sediments into the Intermediate Aquifer and not captured by the Area B extraction wells could be transported into the Deep Cohansey Aquifer.

The site-wide groundwater model was updated and used to simulate Hg and trichloroethylene (TCE) transport in Areas B and U with the objective of optimizing the Area B remediation system to prevent downward migration of Hg while maintaining VOC capture. This report summarizes background information on Areas B and U, the procedures and results of the groundwater model update, and the results and conclusions pertaining to the Hg and TCE transport modeling.

1.1 Background Information

1.1.1 Area B

Area B is defined by VOC-impacted groundwater near the former sewage treatment plant and along a portion of the SBAC (Figure 4), which flows from west to east. The western part of Area B was used during the late 1950s and early 1960s for aircraft fire training. By 1965, the area had been graded. A portion of this western area was later used for General Services Administration motor-pool parking.

The majority of the SBAC was channelized in three stages between 1957 and 1965. The section adjacent to Area B was channelized between May 3, 1957 and December 14, 1959, based on historical aerial photography. The current SBAC adjacent to Area B is characterized by a straight channel and abandoned meanders of the former channel containing water that discharges into the SBAC.

The Area B remedial investigation consisted of six phases conducted between December 1986 and July 1993. During these investigations, inorganic constituents and VOCs, including petroleum hydrocarbons and chlorinated VOCs, were detected in groundwater above drinking water standards and groundwater quality standards. The former fire training and/or GSA motor pool activities are the suspected sources of shallow groundwater contamination.

Human health and ecological risk assessments were conducted for Area B, and a feasible study was prepared. A Record of Decision (ROD) for the site was signed on September 20, 1996. The ROD called for the remediation of petroleum constituents and chlorinated VOCs in groundwater using in-situ soil vapor extraction and air sparging. The ROD allowed for a contingency action consisting of groundwater extraction and treatment, should additional investigations indicate that the in-situ treatment method was unsuitable for use at Area B.

Following the signature of the ROD in 1996, a significant increase in chlorinated VOC levels was noted in a down-gradient shallow Area B well during quarterly sampling. Subsequent pre-remedial design investigation activities conducted at Area B between July 1999 and July 2000 indicated that the chlorinated VOC plume was more extensive than initial investigations had indicated, with the Intermediate Cohansey Aquifer also impacted by chlorinated VOCs.

Based on the expanded extent of the plume, both spatially and vertically, the costs to implement air sparging and soil vapor extraction over the entire plume became prohibitive. Therefore, the remedial design for Area B incorporated the contingency groundwater extraction and treatment approach consisting of the following components:

- Groundwater extraction wells (Shallow and Intermediate Cohansey Aquifer);
- Groundwater injection wells (Intermediate Cohansey Aquifer);
- Groundwater monitoring wells (Shallow and Intermediate Cohansey Aquifer);
- Central treatment plant (CTP), which treats groundwater extracted from Areas B, D, and 41;
- Sprinkler system (and a subsequent expansion of the sprinkler system; Shallow Cohansey Aquifer); and
- Recharge bed (Shallow Cohansey Aquifer).

The remedial system was constructed in a phased manner between 2002 and 2009. The locations of the Area B extraction wells are shown in Figure 5, and the locations of the CTP, the Area B injection wells, and the recharge bed are shown in Figure 3. Area B monitoring well locations are shown on Figure 10. In October 2008, the CTP began receiving groundwater extracted from Areas B, D and 41 as part of shakedown and startup activities, with full-scale groundwater extraction at Area B beginning in February 2009.

1.1.2 Area U

Area U was identified primarily based on the results of ecological risk assessment (ERA) studies conducted by the U.S. Fish and Wildlife Service (USFWS) in 1994 and 1997. Area U consists of the watersheds of the SBAC and the North Branch of Absecon Creek (NBAC), including the Upper and Lower Atlantic City Reservoirs, and encompasses the reach of the SBAC in Area B (Figure 2). The USFWS studies identified the presence of Hg in the sediments and biota of the SBAC. A Preliminary Assessment/Site Investigation (PA/SI) was conducted in 1999 and 2000 (TRC, 2000), followed by an RI and ERA that were conducted from March 2001 through January 2003. The SBAC studies included both the current channel and the abandoned meanders of the old channel that continue to retain water today. The RI and Supplemental RI/ERA studies of Area U confirmed that the main contaminant of concern is Hg, especially within the sediments, floodplain soils, surface waters, groundwater seeps and, to a lesser extent, groundwater of the SBAC and its abandoned meanders. Hg is also present within the sediments of the NBAC, but generally at isolated locations. Sediments in the Upper and Lower Reservoir also exhibit the presence of Hg, with the lowest levels detected in the Lower Reservoir. Biota within the NBAC and SBAC watersheds was also found to be impacted by Hg. The FAA retained Dr. Richard F. Bopp of Rensselaer Polytechnic Institute to conduct a geochemical tracer study of sediment core samples from Area U, including SBAC meander sediment. The study indicated that the Hg contamination within the meander sediment occurred prior to 1954, based on the presence of elevated Hg levels in combination with non-detectable or barely detectable 137Cs (cesium-137 or Cs-137) levels. The occurrence of Hg-impacted sediments prior to 1954 indicates that Hg was released in the meanders of the SBAC during the Navy's occupation of the facility. These results were also supported by the results of dendrochemical dating of Hg within tree trunk and root samples collected from abandoned SBAC meander areas (TRC, 2003 and TRC, 2004).

In recent communications, Dr. Bopp indicated it is highly probable that much of the Hg contamination of the meander sediments in Area B would have occurred prior to the channelization completed in 1959. Dr. Bopp indicated that the area around SBAC meander sample location SB-41 (Figures 2 and 13), where dating of Hg contamination in a sediment core indicated it occurred prior to 1954, appears to be a reasonable analog for the abandoned meanders and adjacent floodplain of Area B. The streambed characteristics of the meanders and vegetation in the two areas are similar. The SB-41 site is approximately 300 feet from the channelized streambed, and the Area B abandoned meanders are characterized by a similar isolation from the direct influence of the channelized streambed. Dr. Bopp's conclusion that much of the Hg contamination in the upstream meander sediments of Area B would have occurred prior to channelization relies on the similarity to the SB-41 site combined with his interpretation of Cs-137 and total Hg measurements conducted on floodplain core sample SB411 and meander core sample SB41M2. In both cores, deeper sections had no detectable levels of the fallout radionuclide Cs-137, indicating Hg contamination occurred prior to the onset of large-scale atmospheric testing of nuclear weapons in about 1954. Several of the deeper sections in each core contained high levels of total Hg which, in Dr. Bopp's opinion, must have been released prior to channelization. Dr. Bopp expects Area B to have undergone similar "pre-channelization" Hg contamination (TRC, 2010c).

Elevated Hg levels (i.e., near to or exceeding 2 ppb) in filtered samples have been found in groundwater from residential land use areas within the Kirkwood-Cohansey Aquifer system, with concentrations at background levels (generally < 0.01 ppb) in most groundwater samples from undeveloped land (Barringer, et al. 2005). The RI and Supplemental RI identified Hg in groundwater in undeveloped areas of the Technical Center. The studies found a direct correlation between locations of elevated Hg in shallow groundwater and elevated Hg in soil/sediment samples and concluded that colloidal particles were the source of the Hg contamination detected in the shallow groundwater samples (TRC, 2003 and TRC, 2004).

1.1.3 USACE Involvement

Separate from the FAA's Superfund activities, the Department of Defense (DOD) began evaluations of historical naval activities at the Technical Center under the Defense Environmental Restoration Program's (DERP's) Formerly Used Defense Sites (FUDS) initiative. Due to the Department of the Navy's historic presence at the Technical Center, any DOD remedial activities associated with the Navy's historic use of the facility would be conducted in accordance with the FUDS Program. The DOD delegated the execution of the FUDS program to the USACE. As chief executor, the USACE is required to resolve Superfund potentially responsible party (PRP) liability issues arising at FUDS properties. Included in USACE's responsibilities are the evaluation of the potential liability of DOD, allocating Superfund responsibilities among all PRPs, and providing legal services related to the resolution of Superfund liability issues. The USACE New York District is responsible for FUDS issues at the Technical Center.

In February 2006, the USACE notified the FAA that further study of Area U under the FUDS program had been approved. Area U investigations were initiated by Weston Solutions in 2008 and 2009. The additional study of Area U had three main objectives: 1) potential source investigations in an area near RI sample location SB-41 (Figures 2 and 13) and in a second area west of Tilton Road; 2) focused sediment hot spot delineation within the SBAC; and 3) an Upper

Reservoir benthic flux study. The source area investigations included surface water, interstitial sediment pore water, and groundwater sampling, geophysics in an attempt to locate buried Hg canisters, and test pitting in areas of geophysical anomalies. The focused sediment hot spot delineation involved the collection of additional sediment samples along the SBAC from Tilton Road downstream to the Upper Reservoir, focusing upon six areas that historically exhibited elevated levels of Hg. The purpose of the Upper Reservoir flux study was to determine the potential production of bioavailable methyl Hg and incorporate the results into a revised site conceptual model. The data from the investigations suggest a regional source of Hg to the groundwater in the area west of Tilton Road. No source was identified near SB-41. The USACE issued work plans for the human health risk assessment and ecological risk assessment of Area U that are under review.

2.0 CHLORINATED VOC CONTAMINATION IN AREA B

Chlorinated VOCs are present in the Shallow Aquifer and Intermediate Cohansey Aquifer at Area B. Monitoring wells, observations wells, and piezometers, installed in Area B as part of the remedial investigations and pre-design studies (Figure 10), provide data on the lateral and vertical extents of the plume. Well construction details are provided in Table 1.

In the Shallow Aquifer, chlorinated VOCs are present in the immediate vicinity of Area B. An approximate footprint of the shallow plume, based on information gathered during the pre-remedial design studies in 1999 and 2000, is shown in Figure 11. In the Intermediate Cohansey Aquifer, the chlorinated VOC contamination migrated over 1,000 feet to the east of Area B, with chlorinated VOCs detected in 2008 in wells (B-MW22I, B-MW22D, B-MW23I, and B-MW23D) on both the western and eastern sides of Amelia Earhart Boulevard (Figure 10).

2.1 Groundwater Remediation Extraction System

The groundwater extraction system at Area B was designed to capture the chlorinated VOC plume throughout the Shallow and Intermediate Aquifers. Seven shallow extraction wells (B-EW1S through B-EW7S) are installed in the Shallow Aquifer (Figure 5). Two middle level extraction wells (B-EW1M and B-EW2M) and four deep level extraction wells (B-EW1D through B-EW4D) are installed in the Intermediate Cohansey Aquifer. Well construction details are provided in Table 1. The extraction well locations and screened intervals were designed to inhibit additional spreading of the plume throughout the aquifer (e.g., to prevent shallow chlorinated VOC contamination from being drawn into deeper portions of the aquifer). The Shallow Aquifer extraction wells are each pumped at about 5 gallons per minute (gpm), and the middle level and deep level Intermediate Aquifer extraction wells (with the exception of B-EW3D) are each pumped at 50 gpm. The total extraction rate at Area B is approximately 285 gpm.

3.0 MERCURY CONTAMINATION

The Area U investigations of Hg contamination included sediment, surface water, and shallow groundwater in the vicinity of the SBAC and its abandoned meanders at and near Area B. Area B specific studies have also provided information on the presence of Hg in groundwater at Area B. Brief summaries of the results of these investigations are provided below. Details of the investigations are provided in TRC (2010a).

3.1 Area U/B Sediment Studies

3.1.1 CERCLA Environmental Investigations

CERCLA sediment investigations along the SBAC and the meanders were conducted in 1987, 1988, 1989, and 1994. The area of sampling extended from Area B to the west end of the Upper Reservoir. The results of the CERCLA environmental investigations of Hg in sediments are summarized in Figures 12A through 12C.

3.1.2 U.S. Fish and Wildlife Service Ecological Risk Assessment

The U.S Fish and Wildlife Service (USFWS) conducted an ecological risk assessment in 1994 along the SBAC that included sampling sediment and biota and an additional study in 1997. Hg was found in the SBAC sediments from Tilton Road to the Upper Reservoir (Figures 12A through 12C).

3.1.3 TRC Investigations

TRC conducted extensive additional sediment investigations in 1998, 1999, 2000, 2001, and 2004 in Areas B and U, including the NBAC and the Upper and Lower Atlantic City Reservoirs, as part of confirmation sampling, site investigation, remedial investigation, and ecological risk assessment programs. Figures 12A through 12C, Figure 13, and Figure 14A and Figure 14B summarize the Hg results of these investigations along the SBAC.

3.1.4 Summary of Findings/Interpretation

The Area U/B sediment studies determined that Hg sediment contamination is widespread along the SBAC, the meanders, and along the western half of the Upper Reservoir. These studies indicated concentrations are locally in the tens of mg/kg and as high as about 500 mg/kg in the SB-41 area. The meanders, areas around confluences of the main channel and the meanders, and areas around culverts generally have the highest Hg concentrations. These areas have slow moving surface water, which may be interpreted to indicate that Hg was transported to these areas and preferentially accumulated under reduced stream velocity conditions. Noteworthy is the observation that some of the highest concentrations are below 1 foot depth, an occurrence consistent with the conceptual model presented in Section 5.4.

3.2 Area U/B Groundwater Investigations

3.2.1 CERCLA Environmental Investigations

Shallow groundwater in Area B monitoring wells B-MW1S, B-MW2S, B-MW3S, B-MW4S, and B-MW5S (Figure 10) was sampled and analyzed for Hg in 1987, 1993, and 1996. Most of the samples were unfiltered, yielding analytical results for Hg as high as 26.7 micrograms per liter (µg/L) (B-MW5S). Filtered aliquots of the same samples with the highest Hg concentrations resulted in a maximum concentration of 8.1 µg/L.

3.2.2 Quarterly Groundwater Sampling

Mercury was analyzed in filtered and unfiltered aliquots of samples from B-MW5S and B-MW-6S in January and April 1999. The January sample from well B-MW5S indicated a Hg concentration of 51.6 µg/L in the unfiltered aliquot and 0.77 µg/L in the filtered aliquot. Hg in well B-MW6S was detected at 2.1 µg/L in the unfiltered aliquot and was not detected in the filtered aliquot. The Hg in the filtered aliquot from B-MW5S and the unfiltered aliquot from B-MW6S was entirely inorganic. In the unfiltered aliquot from B-MW5S, 33.4 µg/L represent inorganic Hg and 18.2 µg/L represent organic Hg.

Low flow sampling was employed in April 1999. Mercury was detected in the sample from B-MW5S at a concentration of 0.38 µg/L in the unfiltered aliquot and at 0.26 µg/L in the filtered aliquot, with inorganic Hg comprising all of the Hg in each aliquot. In the sample from well B-MW6S, Hg was detected at a concentration of 0.13 µg/L in the unfiltered aliquot, with the Hg almost evenly split between organic and inorganic Hg, and was not detected in the filtered aliquot.

Hg results of the CERCLA investigations and quarterly sampling events at Area B through April 1999 are summarized in Table 2. With the exception of well B-MW1S, all of the wells sampled during the CERCLA investigations and quarterly sampling that exhibited Hg are located within approximately 75 feet of the SBAC.

3.2.3 Area B Pre-Design Investigation Microwell and Groundwater Sampling

TRC installed 17 temporary PVC microwells, and groundwater samples were collected for total and dissolved (filtered) Hg analyses. The microwell locations are shown on Figure 15.

In samples collected within 75 feet of the SBAC, Hg was detected at concentrations ranging from 0.12 µg/L (B-GP32) to 1.2 µg/L (B-GP35). Only one unfiltered sample collected more than 75 feet from the stream (B-GP47) exhibited a detectable concentration of Hg (0.70 µg/L). Mercury was not detected above the detection limit of 0.10 µg/L in any of the filtered groundwater samples. The concentrations of Hg detected at each microwell are shown on Figure 15.

In July 2000, filtered and unfiltered groundwater samples were collected from select Area B wells, including Shallow Aquifer monitoring wells B-MW10S and B-MW11S (Figure 10) and Shallow/Intermediate and Intermediate Aquifer extraction wells B-EW1M and B-EW1D (Figure 5). No Hg was detected in the groundwater samples collected from the Shallow/Intermediate and Intermediate Cohansey Aquifer. In the Shallow Aquifer wells, Hg was detected only in the filtered sample from well B-MW11S at a concentration of 15.2 µg/L.

3.2.4 Area U Piezometers

During the Area U remedial investigation, 50 shallow piezometers were installed along ten longitudinal transects crossing the SBAC floodplain from the Upper Reservoir upstream to Tilton Road (Figure 16). The piezometers were installed to approximately 5 feet below the water table.

Groundwater samples were collected from the piezometers in August 2001 and during the Supplemental RI/ERA on three consecutive quarterly sampling events in June, September, and December 2004 using low-flow sampling techniques. Both filtered and unfiltered samples were collected. In addition, during the first June 2004 sampling event, samples from four piezometers (i.e., PZ-33, PZ-37, PZ-38, and PZ-42), which had exhibited elevated total and filtered Hg concentrations during 2001 RI sampling event, were initially filtered in-line with the standard 0.45-µm filter, then subsequently with a Geotech cellulose-nitrate 0.1-µm flatstock filter membrane. The filtrate from both filters was submitted for Hg analysis. In addition, a second aliquot of the 0.1-µm filtrate underwent ultrafiltration through a 0.0015-µm filter in order to remove all of the colloidal-sized particles prior to Hg analysis.

Mercury was detected in a number of the Area U piezometers located in the vicinity of Area B in one or more of the sampling events, namely PZ-16, -17, -18, -22, -26, -27, -32, -33, -37(R), and -38, and was detected in both filtered and unfiltered samples at concentrations ranging from non-detectable to 2.3 µg/L (filtered and unfiltered results at PZ-18). The locations of the piezometers within the vicinity of Area B that exhibited Hg in detectable concentrations are shown on Figures 12A through 12C. Three of the four samples (i.e., PZ-37(R), PZ-38, and PZ-42) that underwent flatstock filtering (0.1 µm filter) and two of the four samples (i.e., PZ-37(R) and

PZ-42) that underwent ultrafiltration (0.0015 µm filter) exhibited low levels of Hg. The Hg concentrations in samples filtered with the flatstock filter ranged from 0.14 µg/L to 0.91 µg/L, and the Hg concentrations in samples that underwent ultrafiltration ranged from 0.10 to 0.26 µg/L. The reductions in mercury concentrations for the samples that underwent ultrafiltration ranged from 74% to 100%.

3.2.5 Summary of Findings/Interpretation

The groundwater sampling and analysis results indicate that Hg occurs in groundwater in close proximity to locations of Hg contamination of sediment, and that elevated groundwater Hg concentrations occur in areas of elevated sediment Hg concentrations. This correlation indicates that the local Hg contaminated sediments in Area U are the source of the local Hg concentrations in groundwater. The Hg in both phases occurs in the general vicinity of the SBAC, with the highest concentrations in both phases in the immediate vicinity of the SBAC and the meanders, particularly areas around confluences of the main channel and the meanders, and areas around culverts, where slow moving water apparently influenced Hg accumulation.

The observations that filtered aliquots commonly have lower Hg concentrations than unfiltered aliquots, and that low flow sampling reduces Hg concentrations in groundwater samples support the occurrence of Hg colloids in groundwater. Furthermore, Hg generally occurs in the inorganic form. The colloidal Hg occurrence suggests Hg transport in groundwater would be inhibited by the aquifer matrix and electrostatic attraction (sorption) of the colloids to sediments, restricting the occurrence of Hg in groundwater to the vicinity of the contaminated sediments, as the data indicate.

4.0 HYDROGEOLOGIC SITE CONCEPTUAL MODEL

4.1 Technical Center Geology

The sedimentary strata underlying the Technical Center property include Quaternary deposits and the Upper Cohansey Sand. The Quaternary deposits are Recent sediments consisting of sand, gravel, and clay ranging in thickness from 30 to 50 feet in the vicinity of the ACMUA well field (Weston, 1984). Sand and gravel are the dominant sediments. Clay beds as thick as 10 feet were encountered during the drilling for the Weston study, but the clay is laterally discontinuous.

The Cohansey Sand, underlying the Quaternary deposits, is part of an Atlantic Coastal Plain, seaward-dipping wedge of unconsolidated sediments that range in age from Cretaceous to Holocene (Rooney, 1971). These sediments were deposited in beach and shelf environments. Interbedded fine-grained sediments are transgressive marine deposits that formed during major incursions of the sea.

The Tertiary Cohansey Sand is generally a deltaic deposit, but it contains sediments from nearshore marine, fluvial, estuarine, lagoonal, and beach environments (Rhodehamel, 1973). The Cohansey Sand is composed of fine to coarse quartz sand, lenses of clay, and lenses of gravel (Hardt and Hilton, 1969). Grain size varies both vertically and laterally, which is consistent with deposition within a coastal environment.

The Cohansey Sand is locally subdivided into an Intermediate Cohansey Aquifer (Intermediate Aquifer) and a Deep Cohansey Aquifer (Deep Aquifer). The Middle Cohansey Clay, 15 to 40 feet thick and separating the two aquifers (Figures 17, 18, and 19), occurs throughout the subsurface beneath the Technical Center property.

The Upper Cohansey Clay locally separates the Cohansey Sand from the shallow Quaternary deposits (Shallow Aquifer) in the vicinity of the ACMUA well field and Area 20A (Figures 17, 18, and 19). The Upper Cohansey Clay pinches out between the Upper Atlantic City Reservoir and Area B. The Upper Cohansey Clay is absent in the vicinity of the Area B injection wells (Figure 18). On the western half of the site, therefore, the Shallow and Intermediate Aquifers are contiguous. Lenses of silt and clay occur within the Shallow Aquifer.

4.2 Area B Geology

The geology and hydrogeology of Area B are defined by data from extensive sets of monitoring wells, piezometers, observation wells, and stream gauges (Figure 10). Figure 7 is an example geologic cross-section for the line of section shown on Figure 6. In general, Area B is underlain by approximately 90 to 100 feet of yellow, orange, white, and brown fine to medium sand with minor silt and clay. Local silty-clay lenses, ranging in thickness from one-inch to several feet, occur within the sand. Gravel lenses, ranging in thickness from one to three feet occur in the western to central portion of Area B (in the vicinity of BMW10, B-MW11, and B-MW12). Given the absence of the Upper Cohansey Clay in Area B, the contact between the Quaternary deposits and the underlying Cohansey Sand is assumed to be transitional, as seen in the vicinity of the Area B injection wells. The Middle Cohansey Clay, comprised of dark grey, stiff clay with local sand lenses, underlies the Cohansey Sand. A pilot hole drilled in the vicinity of B-MW14 indicates this clay is approximately 15 feet thick in Area B.

4.3 Hydrology and Hydrogeology

The 30-year (1981-2010) average annual precipitation at the Atlantic City International Airport is 41.75 inches (http://climate.rutgers.edu/stateclim_v1/norms/daily/atlanticcityap.html). Model calibration for a CEA delineation performed by TRC at the Technical Center (the Area 29 CEA delineation) indicated that groundwater is recharged at a rate of 21.6 percent of the average annual precipitation rate (TRC, 2009). This recharge rate was applied for calibration of the site-wide (Technical Center) comprehensive, three-dimensional numerical groundwater flow model developed for delineating the groundwater CEA for Area B injection, Area 41 injection, and the recharge bed (TRC, 2010b).

The Shallow Aquifer is unconfined. Shallow groundwater levels and flow are controlled by surface water drainages and reservoirs. The Intermediate Aquifer is confined in the vicinity of the Upper Atlantic City Reservoir and Area 20A (Figures 18 and 19). The Intermediate Aquifer is unconfined west of the Upper Atlantic City Reservoir. Aquifer testing data (TRC, 2010b) indicate the hydraulic conductivity of the Intermediate Aquifer is much higher than the Shallow Aquifer. Partly due to this difference in hydraulic conductivity, the potentiometry of the Intermediate Aquifer is distinct from the Shallow Aquifer, even in areas where the Intermediate Aquifer is unconfined.

The Deep Aquifer is confined. The ACMUA wells are completed in the Deep Aquifer (Figure 19). Results of analyses of pumping test data for the ACMUA well field indicated that the Middle Cohansey Clay is a leaky aquitard (Weston, 1984). In general, vertical gradients on the eastern side of the site are currently downward from the Shallow Aquifer into the Deep Aquifer. Pumping-induced head losses in the Deep Aquifer propagate through the Middle Cohansey Clay, influencing groundwater flow in the Intermediate Aquifer.

Discharge of groundwater to the SBAC is a significant influence on the potentiometry of the Shallow and Intermediate Aquifers. West of the Upper Atlantic City Reservoir, where the Shallow and Intermediate Aquifers are contiguous (no Upper Cohansey Clay) and unconfined (e.g., Figure 7), the effect of this discharge is pervasive to the base of the Intermediate Aquifer, generating upward vertical gradients beneath the SBAC.

5.0 GROUNDWATER FLOW AND TRANSPORT MODELING

The site-wide (Technical Center) comprehensive, three-dimensional numerical groundwater flow model (TRC, 2010b), constructed and used for establishing groundwater classification exception areas for discharged treated groundwater, was updated and used to simulate Hg and TCE transport in Areas B and U. The referenced report provides a full description of the model, including the calibration. The model update resulted in minor modifications to the flow model, described in the following subsection. Modifications to the Technical Center model that were undertaken for the Area E remediation system design modeling work are described in TRC (2010d). The current model includes these modifications.

The original objective of the Hg and TCE modeling effort was to optimize the Area B remediation system to prevent downward migration of Hg from the Shallow Aquifer while maintaining VOC capture. Sections 5.3 through 5.5 document the reasons that modification of the remediation system is unnecessary.

5.1 Modifications of Technical Center Groundwater Flow Model

The current flow model represents a complete and comprehensive update of inputs and modifications of the finite-difference grid. The objective was to attain the highest level of confidence for evaluating Hg and TCE transport. The model domain is shown in Figure 20. The finite-difference grid is shown in Figure 21.

The finite-difference grid was modified spatially and vertically to increase groundwater flow and transport accuracy. The spatial modifications are decreased grid cell dimensions from 100 feet by 100 feet to 25 feet by 25 feet in the regions of the Area B Hg and VOC plumes and across Area D. A model layer was added within the vertical region of the model representing the Shallow Aquifer to improve resolution of simulated vertical hydraulic gradients and accuracy of locating model shallow well screens, as well as increased transport accuracy. The model currently has five-foot thick layers from the water table to about the middle of the Intermediate Aquifer, a resolution that enables good reproduction of flow in the vertical section critical to the accuracy of the Hg and TCE transport simulations. The Area D grid cell modifications were undertaken for the Area D plume capture optimization effort performed concurrently with the Hg and TCE fate and transport modeling.

The update of inputs includes the addition of supplemental pumping wells and monitoring wells (calibration water level targets) that were considered of secondary importance during the previous modeling efforts. An example is the Area 20A shallow extraction and monitoring wells. The current model incorporates all wells within the model domain. Spatial locations and screen elevations of all wells were verified or adjusted slightly to conform to the modified grid. Stream channel elevations represented by model drains were verified. Several small ponds east of the Area 20A recharge basin were added.

5.2 Flow Model Verification

A flow model verification of previously calibrated hydraulic properties (TRC, 2010b) was performed subsequent to the finite-difference grid modifications and update of inputs. The verification was performed as a steady-state simulation with site-wide December 2010 hydraulic stresses and water levels as calibration verification targets. The verification stresses include December 2010 average rates for the ACMUA wells and for all FAA remediation systems. The December 2010 water level targets include a large number of additional monitoring well water levels in Areas B and U as well as Area 20A from wells that did not have water levels or were omitted as relatively unimportant for the previous calibration effort (TRC, 2010b). This verification process resulted in confirmation of the previously calibrated hydraulic conductivities with this independent data set of water levels and stresses, an important factor for the high level of confidence in the model for the Hg and TCE evaluations.

Figure 22 shows a summary of the results of the flow model verification in the form of a graph of simulated versus measured heads for all water level targets in the model domain. The nearly one-to-one correspondence over a large range of measured heads reflects the good reproduction of December 2010 groundwater flow throughout the model domain with the previously calibrated hydraulic conductivities and prescribed model boundary conditions. The simulated Shallow Aquifer potentiometry for December 2010 (Figure 23) is strongly controlled by surface water features (e.g., SBAC and Atlantic City Reservoirs). The simulated Deep Aquifer potentiometry for December 2010 (Figure 24) is strongly controlled by ACMUA production well pumping. Detailed views of December 2010 simulated potentiometry and calibration errors (in feet) in Areas U, B, D, and 41 for the Shallow Aquifer, the middle section of the Intermediate Aquifer, and the deep section of the Intermediate Aquifer are shown in Figures 25, 26, and 27, respectively. These exhibits show that the model is well calibrated at all levels in the area of greatest interest for this modeling effort, indicating that the model reproduces vertical hydraulic gradients. The exhibits also show the strong, pervasive effect of the SBAC to the base of the Intermediate Aquifer.

5.3 Hg Transport Modeling

Calibration of the Hg transport model was originally conceived as a necessary step to use the model as a reliable tool for developing modified pumping rates of the Area B remediation wells to mitigate Hg transport under the premise that the extraction of groundwater from the Area B middle level and deep level screened wells was inducing downward migration of Hg from the shallow SBAC sediments (TRC, 2010a). Unsuccessful attempts at calibration to measured Hg concentrations in extraction and monitoring wells under this premise, particularly middle and deep screened wells, eventually led to use and calibration of the model to develop a revised conceptual model of Hg distribution and transport.

The calibration simulation was initially set up to begin Hg transport on February 17, 2009, when the CTP began full-time operation. Transport calibration targets included: 1) July 2010 - Hg concentrations in the Area B extraction wells (pumped water) and 2) July and December 2010 - Hg concentrations in Area U piezometers and Area B and D monitoring wells (Table 3). The simulation continued into a predictive period of 30 years (2011 – 2040).

Quarterly stress periods were used for the calibration period through December 2010. Quarterly average rates for Areas B, D, and 41 extraction wells, the recharge bed, and the ACMUA production wells were implemented in the model simulation. Otherwise, in the absence of quarterly data, the flow model verification rates comprised of December 2010 average rates for Area 20A extraction and injection wells and Areas B and 41 injection wells were used.

The predictive period of the transport simulation utilized full-year 2010 average rates for the ACMUA wells, Areas B and 41 extraction wells, and the recharge bed. For Area D, modified rates and locations, developed in January 2011, were applied. Area E was simulated to begin pumping in July 2011 at the design rate of 5 gpm per well (TRC, 2010d). Otherwise, in the absence of full-year 2010 data or other constraints, the flow model verification rates comprised of December 2010 average rates for Area 20A extraction and injection wells and Areas B and 41 injection wells were used. The level of the Upper Atlantic City Reservoir was simulated to rise from 18.84 feet to 23.34 feet (bank full) in July 2011.

The initial Hg calibration attempts included a spatially-variable constant concentration source in the Shallow Aquifer based on contoured concentrations of Hg in shallow groundwater wells (Figure 28). The effects of colloidal transport were conceptualized and implemented through model properties of high dispersivity and low effective porosity that combine to simulate rapid transport through tortuous pathways in media that limit colloid transport to the largest and most connected pores. The objective was to accelerate transport from the shallow sediments to the middle and deep well screens. The source based on Figure 28 was incrementally and contiguously applied, first in the uppermost model layer, approximately corresponding to shallow SBAC sediments (2.5 – 9 feet of saturated thickness), then added to the remainder of the Shallow Aquifer (10 feet deeper), and finally also defined deep within the Intermediate Aquifer in a series of probing calibration simulations. The results showed that the deeper the source was defined, the better the simulated results were for the middle and deep well screens, albeit far from satisfactory.

The unsuccessful calibration attempts described in the previous paragraph led to an approach based on an hypothesis that the free metal liquid Hg occurs locally in the pores of the shallow sediments, specifically in areas of sediment "hot spots" (Figures 12 - 14), and accounts for some high shallow monitoring well concentrations (Table 3) ranging from 14 to 35 percent of the 25 µg/L equilibrium solubility limit of liquid Hg (Hem, 1992). Local constant concentration sources of 25 µg/L were defined first in the uppermost model layer then to the base of the Shallow Aquifer in unsuccessful attempts with the high dispersivity and low effective porosity properties to simulate measured concentrations in the middle and deep well screens. Even an extreme simulation with a spatially continuous 25 ug/L constant concentration source along the length of the SBAC to the base of the Shallow Aquifer fell far short of developing the measured concentrations in the middle and deep well screens. A conceptual model test using low dispersivity (minimal mixing) with normal effective porosity was also unsuccessful.

Several final attempts were made to match middle and deep well screen concentrations using Shallow Aquifer constant concentration Hg sources in the various scenarios described in the previous paragraphs in a 55-year simulation (1955 – 2010). Based on the forensic evidence presented in Section 1.1.2, it was assumed that the Hg was released within the SBAC during the 1955 timeframe. It was also assumed that the data prior to Area B remediation are insufficient to conclude that dissolved or colloidal Hg did not occur in the Intermediate Aquifer at the depths of the middle and deep well screens prior to startup of Area B extraction. The hydraulic stresses for these simulations are based on available data (Appendix A), including the initiation of ACMUA well pumping in 1985 and the FAA remediation systems in the early 1990s. The results for this set of simulations demonstrated that even a long period of Hg transport from Shallow Aquifer sources cannot produce concentrations even approaching the measured concentrations in the middle and deep well screens.

A common observation of the results of all simulations described in the previous paragraphs is that the shallow well concentrations could be reasonably reproduced. It was also noted in the simulation results that mass was not advected vertically downward from the Shallow Aquifer by the middle and deep extraction wells. However, these same wells were laterally advecting the limited mass that had reached these depths in the simulations by the vertical component of dispersion (explicitly simulated and/or resulting from unavoidable numerical dispersion implicit in the governing transport equation). These observations prompted a detailed examination of model vertical gradients and a critical review of measured heads at the depths of all monitoring well screens.

5.3.1 Vertical Gradient Evaluations

The basis for the detailed evaluation of simulated vertical gradients is the good calibration of the flow model at all elevations/depths, with ample data beneath the SBAC for constraining the calibration in this critical area of interest (see Figures 25, 26, and 27). The good match of simulated and observed heads under the conditions of remediation pumping implies that the simulated vertical gradients accurately reflect field conditions. Model cross-sections of potentiometry parallel to the SBAC (Figures 29, 30, and 31) show low pressure regions (inward gradients) around the middle and deep extraction well screens in the Intermediate Aquifer (white hydrostratigraphic unit), but gradients reverse and flow is upward above these well screens. These conditions cannot advect mass from the Shallow Aquifer (colored hydrostratigraphic units above Intermediate Aquifer) or SBAC stream sediments into the middle and deep well screens.

Particle tracking results confirm the upward gradients and flow in the Shallow Aquifer. Figure 32 shows the starting locations of particles in the lower section (Layer 2) of the Shallow Aquifer throughout Area B. The particles depart from Layer 2 in either nearly vertical trajectories (Figure 33) or after a short migration path in Layer 2 (particles furthest from SBAC). In both cases, the particles emerge in Layer 1 and discharge to the SBAC main channel or the meanders (Figure 34). Figure 35 shows the particle paths in Layer 1 and distinguishes their transport path by layer (color), combining the paths in Figures 33 and 34. None of the particles transports downward into Layer 3.

Upward flow of groundwater in the unconfined aquifer in the vicinity of the SBAC is an expected consequence (fundamental hydrogeological principle) of the stream channel occurrence at much lower elevations than the water table north and south of the channel. Natural gradients are upward in the vicinity of a gaining stream (groundwater discharging to stream). The Area B extraction wells modify the gradients locally (Figures 29, 30, and 31), but do not pervasively reverse the natural gradients.

Evaluation of field measured heads under the current pumping conditions (e.g., June 2009) and pre-remediation conditions (May 2008) supports the modeling observations. Differences in head between measurements in shallow and middle monitoring well screens and between measurements in middle and deep monitoring well screens were calculated and plotted to illustrate flow directions under both pre-remediation and current conditions (Figures 36, 37, 38, and 39). The most important well pairs with respect to evaluating the potential for Hg advection from the shallow sediments into the Intermediate Aquifer are the shallow and middle screened monitoring wells. Graphs of the shallow-middle head differences (Figures 36 and 37) show that gradients are upward near the SBAC and meanders (well pairs B-MW10S/I, B-MW11S/I, and B-MW12S/I). Although the head differences change from pre-remediation to current conditions (a function of many factors such as precipitation and streamflow, as well as the pumping), the flow directions are unchanged. Note that monitoring wells B-MW10S/I and B-MW11S/I are located near extraction well B-EW1M, completed at a middle depth in the Intermediate Aquifer and pumped at a rate of 56 gpm in June 2009.

Graphs of the pre-remediation middle-deep head differences (Figure 38) show that gradients were generally upward near the SBAC and meanders, with some exceptions (B-MW18I/D, B-MW20I/D, and B-MW23I/D) of slight downward gradients at the east end of Area B that may be related to ACMUA well pumping. Reversal of the flow direction from upward to downward from pre-remediation to current conditions (Figure 39) occurred only at B-MW11I/D (near B-EW1D) and B-MW22I/D (near B-EW4D). Significant, however, is that shallow gradients are upward at these locations. This evaluation of field measured heads supports the observations from modeling that the remediation wells are not advecting Hg downward into the middle and deep depths from the shallow sediments. Noteworthy are Hg detections in middle and deep screened wells that are located at considerable distances from the extraction wells. These observations led to a revision of the conceptual model of Hg distribution and transport and the conclusion that modification of the remediation system is unnecessary.

5.4 Revised Conceptual Model

The revised conceptual model of Hg distribution and transport is illustrated by Figure 40. The local shallow sediment "hot spots" around the confluences of the SBAC and meanders and around the road culverts are the loci of concentrated accumulations of liquid Hg that was released upstream in or near the SBAC and was advected by the streamflow to the hot spot areas. These areas correspond to low energy stream environments, where much of the Hg load in streamflow was deposited. The widespread occurrence of shallow Hg along the SBAC, meanders, and in the flood plain is consistent with historical transport of the Hg by streamflow and floodwaters.

Mercury is an extremely dense liquid (13.53 g/cm^3) at ordinary temperatures and can be the ultimate dense non-aqueous phase liquid (DNAPL) in groundwater (Davies, USEPA, 2007) with a density about 10 times common DNAPLs (e.g., PCE, TCE, etc.). According to the revised conceptual model, the hot spots persist to considerable depths in the saturated zone, well below the shallow sediments deposited by the SBAC. Sufficient high density liquid Hg accumulated in the low energy environments to migrate downward through the saturated zone as a DNAPL long before the Area B remediation extraction. Beneath the shallow sediment hot spots, local pure phase Hg sources occur at residual saturation (very small immobile quantities) in the pores of the aquifer sediments to considerable depths. These sources release dissolved and colloidal Hg for lateral transport to the remediation extraction wells. Mercury is not advected downward into the Intermediate Aquifer from the shallow streams sediments.

Among known Hg DNAPL sites is the Alcoa/Lavaca Bay Superfund Site in southeast Texas (http://www.epa.gov/tio/tsp/download/baumgarten-rpmpanel.pdf). Residual Hg DNAPL in sediment pores has been documented to occur to at least 10 meters below ground surface (bgs) at a site in the Netherlands (http://www.nielshartog.nl/DNAPL/).

Reasons for the perceived absence of Hg at the levels of the middle and deep screened wells prior to remediation extraction include limited monitoring well data and higher detection limits than used for recent analyses (due to higher historic Hg groundwater action limits of 2 μg/L and 0.5 μg/L compared to the current action limit of 0.05 μg/L which necessitated the use of Hg test methods with much lower detection limits). Also, natural transport of the Hg is limited. There is a tendency for dissolved Hg to form colloids which are adsorbed to or impeded by the sediment matrix, and the natural groundwater gradient is low along the SBAC (<0.002). Consequently, the colloidal Hg was retained near the residual Hg DNAPL sources. The remediation extraction wells greatly increased gradients, thereby laterally advecting dissolved and colloidal Hg from nearby sources.

5.5 Revised Hg Transport Modeling Approach

Model Hg sources were defined locally in sediment hot spot areas around the confluences of the SBAC and meanders, around road culverts, and in meanders. These sources were defined as constant concentrations ranging from 0.5 μg/L to 9.0 μg/L in the shallow sediments. In a couple of these hot spot areas in the vicinity of B-EW1D and B-EW4D, vertical columns of constant Hg concentrations ranging from 2.0 μg/L to 4.5 μg/L were specified, decreasing in concentration with depth. These sources represent Hg DNAPL at residual saturation in decreasing specific volume with depth. Elsewhere along the SBAC and meanders, a low constant concentration of 0.065 μg/L was defined in shallow ground water, representing widespread shallow dispersed Hg at low concentrations. This concentration is similar to many of the concentrations measured in the Area U piezometers. The shallow and deeper Hg source distributions are shown in Figures 41 and 42, respectively. The source concentrations and distributions were calibrated by reproducing measured concentrations in monitoring and extraction wells. The extraction well concentrations are the simulated pumping concentrations.

5.5.1 Calibration Results

The simulated Hg plume in shallow groundwater in 2010 is shown in Figure 43, which includes the calibration errors (differences between measured and simulated Hg concentrations). The locations with green values of 0.001 represent Area U piezometers in which Hg was not detected. The simulated shallow Hg plume closely reproduces measured concentrations and illustrates the limited distribution of Hg in groundwater to the vicinity of the SBAC and meanders. Figures 44 and 45 represent the simulated Hg plume and calibration errors at the levels of the middle and deep well screens, respectively.

Table 3 summarizes the Hg transport calibration results indicating that there is a good match between simulated and measured concentrations at nearly every monitoring point. Noteworthy is the good reproduction of extraction well concentrations, providing confidence in the revised conceptual model of Hg sources deep within the saturated zone. Comparison of the middle and deep extraction well errors for the calibration with the errors for test simulations with only shallow sources (Table 4) reinforces the credibility of the deep Hg sources.

5.5.2 Hg Transport Predictions

Predictive transport of Hg was simulated for a period of 30 years with continuous operation of the Area B remediation wells and the other model stresses discussed in Section 5.3. The results at the levels of the shallow, middle, and deep well screens are shown in Figures 46, 47, and 48, respectively. These results indicate that Hg transport from sources in the vicinity of the SBAC will continue to be limited in extent.

5.6 TCE Transport Modeling

TCE transport was simulated to confirm that the plume is being captured with the current remediation system and rates. The simulation is predictive only, beginning with conditions corresponding to July 2010. The simulated initial concentrations are based on July 2010 data corresponding to the shallow, middle, and deep wells screens (Figure 49). The plume configurations for each of these levels were interpolated vertically to develop a three-dimensional distribution of model initial concentrations. Figure 50 shows this distribution in the context of the remediation extraction wells and the Intermediate Aquifer potentiometry.

Retardation of TCE for sorption on sand was simulated with a distribution coefficient (K_d) of 6.11 milliliters per gram (ml/g), calculated from published data on the distribution coefficient for organic carbon (K_{oc}) and the weight fraction of organic carbon in the sediment (f_{oc}) according to the expression:

$K_d = K_{oc} \times f_{oc}$

The published K_{oc} value is 235 ml/g (Dragun, 1998). An f_{oc} value of 2.6% was reported by Uchrin and Mangels (1986) for the Cohansey Aquifer. TCE is strongly retarded, exemplified by a retardation factor of 29 for the Intermediate Aquifer indicating that the migration of TCE is slowed by a factor of 29 relative to the seepage velocity of groundwater.

Figures 51, 52, and 53 show the three-dimensional configurations of the TCE plume for 2020, 2030, and 2040. The predictive simulation shows that TCE is captured by the remediation wells, and concentrations are reduced to less than 1 μg/L by 2040.

6.0 CONCLUSIONS

The main conclusion from this modeling study is that modification of the VOC extraction system is unnecessary because groundwater extraction is not advecting Hg downward from the shallow sediments of the SBAC into the Intermediate Aquifer. The Area B remediation system is adequately capturing the VOC plume.

Another important conclusion is that a revised conceptual site model has been developed in which Hg DNAPL is present at depth below the SBAC and adjacent areas where low energy environments (i.e., abandoned meanders, culverts, and flood plain) occur. Beneath the shallow sediment hot spots, local pure phase Hg sources occur at residual saturation (very small immobile quantities) in the pores of the aquifer sediments to considerable depths. These sources release dissolved and colloidal Hg for lateral transport to the remediation extraction wells. It is believed that the Area B middle and deep extraction wells are not causing the advection of Hg downward into the Intermediate Aquifer from the shallow streams sediments. Natural colloidal transport of Hg is limited by effective porosity and sorption. Pumping stresses can locally affect transport due to increased gradients. Stabilization of Hg influent concentrations in the CTP reflects attainment of steady-state transport between Hg DNAPL sources and the Area B extraction wells.

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Table 1
Area B Well Construction Summary
FAA William J. Hughes Technical Center

WELL ID	COMPLETION DATE	SOIL BORING DEPTH (FT)	TOP OF CASING ELEVATION (NAVD88)	GROUND ELEVATION(NAVD88)	TOP OF SCREEN ELEVATION (NAVD88)	BOTTOM OF SCREEN ELEVATION (NAVD88)	SCREEN LENGTH (FT)
B-MW1S	4/09/87	12.00	51.72	48.76	36.8	16.8	20.0
B-MW2S	4/13/87	3.00	37.74	35.88	32.9	12.9	20.0
B-MW3S	4/13/87	3.00	42.11	39.52	36.5	16.5	20.0
B-MW4S	1/21/93	3.00	39.43	36.94	33.9	13.9	20.0
B-MW5S	1/22/93	4.00	38.78	36.54	32.5	12.5	20.0
B-MW6S	7/22/93	3.00	35.31	32.62	29.6	19.6	10.0
B-MW7S	7/23/93	4.00	41.06	38.20	34.2	24.2	10.0
B-MW7I	8/03/99	45.00	40.59	37.94	-7.1	-17.1	10.0
B-MW7D	8/02/99	87.00	40.84	38.08	-48.9	-58.9	10.0
B-MW8S	7/26/93	5.00	43.31	40.60	35.6	25.6	10.0
B-MW9S	7/26/93	4.00	42.28	39.51	35.5	25.5	10.0
B-MW10S	8/6/99	5.00	36.11	33.60	28.6	18.6	10.0
B-MW10I	8/05/99	40.00	36.15	33.49	-6.5	-16.5	10.0
B-MW10D	8/05/99	81.00	36.03	33.41	-47.6	-57.6	10.0
B-MW11S	8/11/99	5.00	36.14	33.71	28.7	18.7	10.0
B-MW11I	8/10/99	40.00	36.41	33.78	-6.2	-16.2	10.0
B-MW11D	8/10/99	80.00	36.46	33.75	-46.3	-56.3	10.0
B-MW12S	8/13/99	5.00	36.78	34.20	29.2	19.2	10.0
B-MW12I	8/12/99	40.00	36.92	34.28	-5.7	-15.7	10.0
B-MW12D	8/12/99	83.00	36.80	34.30	-48.7	-58.7	10.0
B-MW13S	8/13/99	5.00	35.25	32.66	27.7	17.7	10.0
B-MW14S	2/07/00	17.00	49.95	47.74	30.7	20.7	10.0
B-MW14I	1/19/00	57.00	50.24	47.94	-9.1	-19.1	10.0
B-MW14D	1/18/00	97.00	50.26	47.81	-49.2	-59.2	10.0
B-MW15S	2/08/00	11.00	42.86	41.07	30.1	20.1	10.0
B-MW15I	1/24/00	50.00	42.79	41.11	-8.9	-18.9	10.0
B-MW15D	1/20/00	87.00	42.90	41.10	-45.9	-55.9	10.0
B-MW16I	1/26/00	44.00	34.29	32.04	-12.0	-22.0	10.0
B-MW16D	1/27/00	81.00	34.34	32.06	-48.9	-58.9	10.0
B-MW17I	2/10/00	45.00	33.71	31.26	-13.7	-23.7	10.0
B-MW17D	2/09/00	85.00	34.36	31.98	-53.0	-63.0	10.0
B-MW18I	2/03/00	45.00	33.15	31.07	-13.9	-23.9	10.0
B-MW18D	2/02/00	71.50	33.22	31.11	-40.4	-50.4	10.0
B-MW19I	2/07/00	48.00	38.65	36.61	-11.4	-21.4	10.0
B-MW19D	2/08/00	83.50	38.54	36.38	-47.1	-57.1	10.0
B-MW20I	10/29/04	55.00	32.95	30.31	-14.7	-15.7	10.0
B-MW20D	10/29/04	90.00	32.96	30.29	-47.7	-57.7	10.0
B-MW21I	10/28/04	57.00	32.25	30.17	-14.8	-15.8	10.0
B-MW21D	10/27/04	90.00	32.40	30.30	-47.7	-57.7	10.0
B-MW22I	5/11/07	55.50	33.90	Not Avail.	-14.6	-15.6	10.0
B-MW22D	5/9/07	90.50	33.53	Not Avail.	-50.0	-60.0	10.0
B-MW23I	5/27/07	55.00	31.58	Not Avail.	-16.4	-26.4	10.0
B-MW23D	5/24/07	90.00	31.33	Not Avail.	-51.7	-61.7	10.0
B-EW1S	1/15/03	27.00	Not Avail.	33.00	26.5	11.5	15.0
B-EW2S	1/16/03	26.50	Not Avail.	34.43	27.9	12.9	15.0
B-EW3S	1/14/03	26.50	Not Avail.	34.53	28.0	13.0	15.0
B-EW4S	2/11/03	26.50	35.84	33.62	27.1	12.1	15.0
B-EW5S	2/12/03	26.00	36.07	33.62	27.6	12.6	15.0
B-EW6S	1/21/03	26.50	36.97	34.86	28.4	13.4	15.0
B-EW7S	2/3/03	27.00	35.58	34.18	27.2	12.2	15.0
B-EW1M	7/17/00	37.00	36.14	34.08	-2.9	-17.9	15.0

Table 1
Area B Well Construction Summary
FAA William J. Hughes Technical Center

WELL ID	COMPLETION DATE	SOIL BORING DEPTH (FT)	TOP OF CASING ELEVATION (NAVD88)	GROUND ELEVATION(NAVD88)	TOP OF SCREEN ELEVATION (NAVD88)	BOTTOM OF SCREEN ELEVATION (NAVD88)	SCREEN LENGTH (FT)
B-EW2M	2/10/03	57.00	Not Avail.	31.74	-0.3	-20.3	20.0
B-EW1D	7/19/00	72.00	36.66	34.34	-37.7	-52.7	15.0
B-EW2D	1/30/03	87.00	Not Avail.	32.43	-29.6	-49.6	20.0
B-EW3D	1/2/03	99.00	46.80	44.00	-30.0	-50.0	20.0
B-EW4D	5/17/07	93.00					30.0
B-OW1	7/21/00	60.00	40.29	37.72	-22.3	-54.3	32.0
B-OW2	7/22/00	60.00	40.87	38.48	-21.5	-53.5	32.0
B-OW3	7/14/00	72.00	37.04	34.58	-37.4	-52.4	15.0
B-OW4	7/15/00	72.00	37.15	34.65	-37.4	-52.4	15.0
B-OW5	7/13/00	37.00	36.89	33.91	-3.1	-18.1	15.0
B-OW6	7/13/00	37.00	36.06	33.34	-3.7	-18.7	15.0

TABLE 2

COMPARISON OF HISTORIC GROUNDWATER SAMPLE MERCURY ANALYTICAL RESULTS - AREA I

FAA William J. Hughes Technical Center

SAMPLE IDENTIFICATION: SAMPLE DEPTH (FT):	B-MW1S 12-32							B-MW2S 3-23					B-MW3S 3-23			B-MW4S 3-23	NJ PQL
SAMPLING ROUND: UNFILTERED / FILTERED	6/87 U	8/96 U	8/96 F	9/96 U	9/96 F	1/99 U	1/99 F	6/87 U	8/96 U	8/96 F	9/96 U	9/96 F	6/87 U	11/88 Product	2/93 U	2/93 U	
Mercury	0.6							0.65	0.11 B		0.16			0.55		0.19	0.5

SAMPLE IDENTIFICATION: SAMPLE DEPTH (FT):	B-MW5S 4-24									B-MW6S 3-13				B-MW7S 4-14		B-MW8S 5-15		B-MW9S 4-14		NJ PQL
SAMPLING ROUND: UNFILTERED / FILTERED	2/93 U	8/96 U	8/96 F	9/96 U	9/96 F	1/99 U	1/99 F	4/99* U	4/99* F	1/99 U	1/99 F	4/99* U	4/99* F	1/99 U	1/99 F	1/99 U	1/99 F	1/99 U	1/99 F	
Mercury	2.2	5.6	0.26	4.8		51.6	0.77	0.38	0.26	2.1		0.13B								0.5

NOTES: ONLY CONCENTRATIONS THAT ARE ANALYTICALLY VALID AND ABOVE THE DETECTION LIMIT ARE SHOWN. BLANK CELL INDICATES MERCURY WAS NOT DETECTED.
SAMPLE ANALYSIS: PRIORITY POLLUTANT METALS (U- UNFILTERED: F - FILTERED) (CLP/ILM 04.0

* - LOW FLOW PURGE AND SAMPLING TECHNIQUE WAS USED DURING THE APRIL 1999 SAMPLING EVENT.

Table 3

Hg Analyses, Model Targets, and Model Errors

FAA William J. Hughes Technical Center

Name	Model Target Value	Model Simulated	Model Error	Mar 2011 Filtered (μg/L)	Mar 2011 Unfiltered (μg/L)	Dec 2010 Filtered (μg/L)	Nov 2010 Unfiltered (μg/L)	Sept 2010 Unfiltered (μg/L)	Aug 2010 Unfiltered (μg/L)	Jul 2010 Unfiltered (μg/L)	Apr 2010 Filtered (μg/L)	Apr 2010 Unfiltered (μg/L)	Mar 2010 Filtered (μg/L)	Mar 2010 Unfiltered (μg/L)	Dec 2009 Unfiltered (μg/L)
U-PZ-1	0.01	1.11E-02	-0.001			0.01									
U-PZ-2	0.001	4.74E-03	-0.004			0.001									
U-PZ-3	0.001	1.62E-06	0.001			0.001									
U-PZ-4	0.001	4.01E-10	0.001			0.001									
U-PZ-5	0.001	3.71E-14	0.001			0.001									
U-PZ-6R	0.001	8.65E-04	0.000			0.001									
U-PZ-7	4.16	4.16E+00	0.000			4.16									
U-PZ-8	0.313	3.16E-01	-0.003			0.313									
U-PZ-9	0.072	6.45E-02	0.007			0.072									
U-PZ-10R	0.001	1.23E-05	0.001			0.001									
U-PZ-11	0.175	1.74E-01	0.001			0.175									
U-PZ-12	0.125	1.21E-01	0.004			0.125									
U-PZ-13	0.0022	3.33E-03	-0.001			0.0022									
U-PZ-14	0.132	1.32E-01	0.000			0.132									
U-PZ-15	0.001	3.30E-08	0.001			0.001									
U-PZ-16	0.0044	1.87E-03	0.003			0.0044									
U-PZ-17	0.0056	1.12E-02	-0.006			0.0056									
U-PZ-18	3.63	3.63E+00	0.000			3.63									
U-PZ-19	0.001	5.73E-05	0.001			0.001									
U-PZ-20	0.001	4.48E-08	0.001			0.001									
U-PZ-21	0.0081	4.81E-03	0.003			0.0081									
U-PZ-22	0.0029	4.57E-03	-0.002			0.0029									
U-PZ-23	0.001	2.63E-05	0.001			0.001									
U-PZ-24	0.001	3.33E-08	0.001			0.001									
U-PZ-25	0.001	7.76E-10	0.001			0.001									
U-PZ-26	0.001	2.36E-03	-0.001			0.001									
U-PZ-27	0.0079	1.49E-02	-0.007			0.0079									
U-PZ-28	0.001	3.26E-03	-0.002			0.001									
U-PZ-29	0.015	1.50E-02	0.000			0.015									
U-PZ-30	0.001	7.98E-06	0.001			0.001									
U-PZ-31	0.0043	3.04E-03	0.001			0.0043									
U-PZ-32	0.013	3.16E-02	-0.019			0.013									
U-PZ-33	8.5	8.51E+00	-0.006			8.5									
U-PZ-34	0.001	8.15E-04	0.000			0.001									
U-PZ-35	0.001	3.48E-07	0.001			0.001									
U-PZ-36R	0.0028	4.78E-03	-0.002			0.0028									
U-PZ-37R	0.188	1.89E-01	-0.001			0.188									
U-PZ-38	0.039	3.39E-02	0.005			0.039									
U-PZ-39	0.049	4.54E-02	0.004			0.049									
U-PZ-40	0.001	3.45E-05	0.001			0.001									
U-PZ-41	0.001	4.62E-04	0.001			0.001									
U-PZ-42	0.015	1.38E-02	0.001			0.015									
U-PZ-43	0.001	3.42E-04	0.001			0.001									
U-PZ-44	0.0034	2.04E-06	0.003			0.0034									
U-PZ-45	0.001	1.12E-07	0.001			0.001									
U-PZ-46	0.0054	7.99E-03	-0.003			0.0054									
U-PZ-47	0.065	6.49E-02	0.000			0.065									
U-PZ-48	0.001	3.51E-04	0.001			0.001									
U-PZ-49	0.001	7.36E-09	0.001			0.001									
U-PZ-50	0.001	2.75E-10	0.001			0.001									
B-MW2S	0.108	1.06E-01	0.002							0.108					
B-MW3S	0.0203	2.21E-02	-0.002							0.0203					
B-MW4S	0.484	4.84E-01	0.000							0.484					
B-MW5S	1.71	1.72E+00	-0.006							1.71					
B-MW7S	0.00185	8.98E-03	-0.007							0.00185					
B-MW8S	0.224	2.22E-01	0.002							0.224					
B-MW9S	0.00519	1.33E-02	-0.008							0.00519					
B-MW10S	0.129	4.09E+00	-3.964				0.129	0.0657	0.0885		0.0039	0.0058	0.011	0.026	0.194
B-MW11S	0.184	1.16E-01	0.068				0.184	0.617	0.611		0.367	0.45	0.026	0.055	0.0647
B-MW12S	2.23	2.17E+00	0.059				2.23	2.9	7.25		0.434	0.49	0.015	0.03	0.17
B-MW13S	0.169	1.65E-01	0.004				0.169	0.101	0.119		0.138	0.166	0.428	0.459	0.0184
B-MW15S	0.0103	1.73E-02	-0.007							0.0103					
BMW-7I	0.052	2.86E-03	0.049							0.052					
B-MW12I	0.002	5.04E-03	-0.003							0.002					
B-MW15I	0.273	2.98E-04	0.273							0.273					
B-MW16I	0.029	1.48E-03	0.028							0.029					
B-MW18I	0.14	1.37E-01	0.003							0.14					
BMW-20I	0.006	2.00E-02	-0.014							0.006					
BMW-21I	0.002	2.42E-02	-0.022							0.002					
BMW-22I				0.0019	0.0000019										
B-MW23I	4.2	4.20E+00	0.000	0.246	0.207		ND		1.74	4.2			ND		
B-MW7D	0.001	4.71E-04	0.001							0.001					
B-MW12D	0.004	8.73E-03	-0.005							0.004					

B-MW15D	0.001	6.64E-05	0.001							0.001					
B-MW16D	0.002	1.28E-03	0.001							0.002					
B-MW18D	0.005	1.00E-02	-0.005							0.005					
B-MW20D	0.0005	7.72E-03	-0.007							0.0005					
B-MW22D	0.0179	1.35E-01	-0.117	0.054	0.02		ND			0.0179				ND	
B-MW23D	0.522	5.66E-01	-0.044	0.262	0.521		ND		0.545	0.522				ND	
D-MW18S	0.449	4.55E-01	-0.006								0.449	0.507	0.613	0.684	
D-MW19S	0.606	6.00E-01	0.006								0.606	0.662	0.727	0.803	
1/2 detection limit															
B-EW1S	0.06	0.066	-0.006							0.06			0.0092	0.033	
B-EW2S	0.47	0.520	-0.050							0.47			0.0024	0.0066	
B-EW3S	0.188	0.195	-0.007							0.188			0.011	0.041	
B-EW4S	2.43	2.380	0.050							2.43	0.399	0.982	0.246	1.22	
B-EW5S	0.263	0.259	0.004							0.263			0.044	0.086	
B-EW6S	0.504	0.503	0.001							0.504			ND	0.0017	
B-EW7S	0.044	0.069	-0.025							0.044			0.0026	0.078	
B-EW1M	0.782	0.890	-0.108							0.782			0.619	0.638	
B-EW2M	0.059	0.077	-0.018							0.059			0.041	0.044	
B-EW1D	0.175	0.178	-0.003							0.175			0.03	0.104	
B-EW2D	0.106	0.116	-0.010							0.106			0.029	0.085	
B-EW4D	0.409	0.378	0.031							0.409			0.12	0.109	

Table 4

Calibrated B-EW Pumped Water Hg Concentrations and Test Simulation Results
FAA William J. Hughes Technical Center

Well	Measured	Calibrated	Test Simulated		
	Sampled 7/2010	Shallow and Deep Sources	Shallow Sources Only	With Historical Simulation; Only Shallow Sources	25 ug/L Shallow Sources Only
B-EW1S	0.06	0.066	0.104	0.113	0.800
B-EW2S	0.47	0.520	0.535	0.540	4.996
B-EW3S	0.188	0.195	0.224	0.227	2.930
B-EW4S	2.43	2.380	1.085	1.097	5.930
B-EW5S	0.263	0.259	0.111	0.113	2.601
B-EW6S	0.504	0.503	0.160	0.157	2.830
B-EW7S	0.044	0.069	0.002	0.002	0.322
B-EW1M	0.782	0.890	0.007	0.008	0.083
B-EW2M	0.059	0.077	0.000	0.002	0.082
B-EW1D	0.175	0.178	0.001	0.001	0.014
B-EW2D	0.106	0.116	0.003	0.003	0.040
B-EW4D	0.409	0.378	0.004	0.005	0.107

Concentrations in ug/L

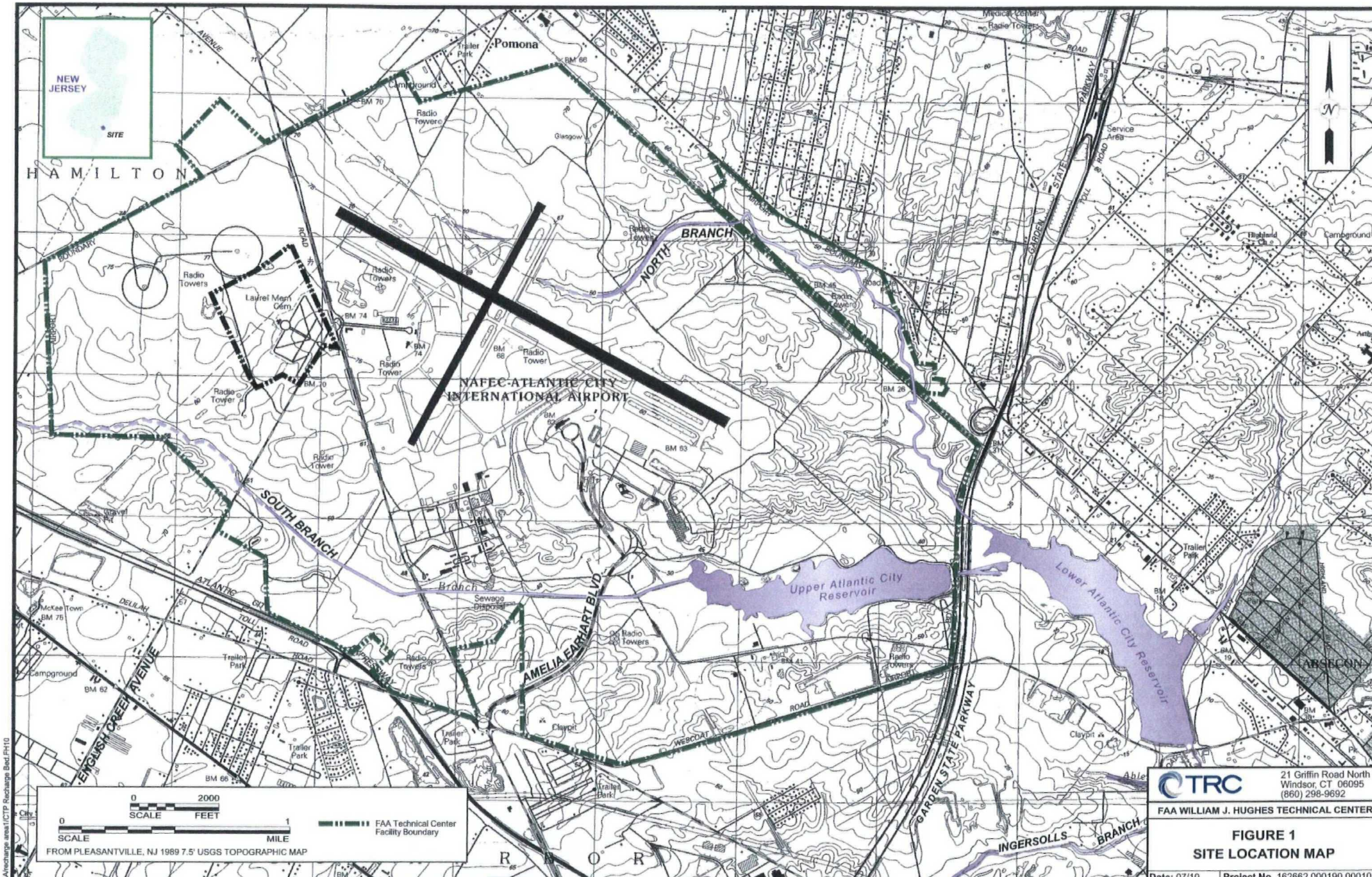
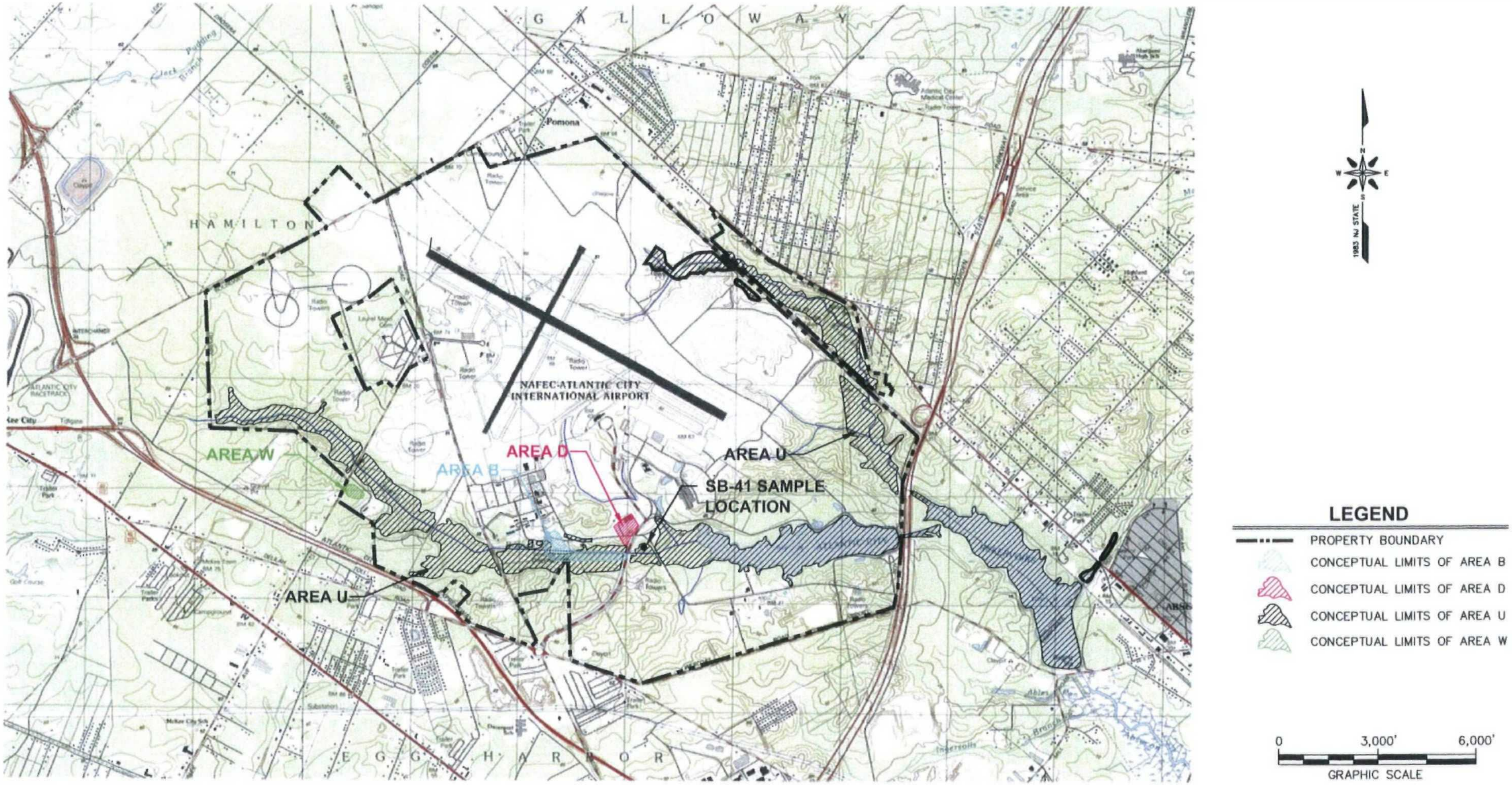


FIGURE 1
SITE LOCATION MAP

Date: 07/10 | Project No. 162662.000190.000101

FAA/recharge area1/CTP Recharge Bed.FH10



NOTE:
AREA U LIMITS OBTAINED AND MODIFIED FROM THE FIGURE ENTITLED "AREA U STUDY AREA-FOCUS OF REMEDIAL INVESTIGATION STUDIES, ECOLOGICAL RISK ASSESSMENT STUDIES AND NATURAL RESOURCE DAMAGE AREAS (NRDA) INCLUDING SOME WETLAND MITIGATION AREAS" DATED: 12-26-00.

"THIS FIGURE WAS DEVELOPED USING NJDEP GEOGRAPHIC INFORMATION SYSTEM DIGITAL DATA, IN CONJUNCTION WITH TRC'S WORK, BUT THIS SECONDARY PRODUCT HAS NOT BEEN VERIFIED BY NJDEP AND IS NOT STATE-AUTHORIZED."

FROM: EGG HARBOR CITY, NJ 1956, PHOTOREVISED 1972, PHOTOINSPECTED 1977 MAYS LANDING, NJ 1989, GREEN BANK NJ 1956, PHOTOREVISED 1972, PHOTOINSPECTED 1977 AND PLEASANTVILLE, NJ 1989 7.5' USGS TOPOGRAPHIC MAPS

TRC
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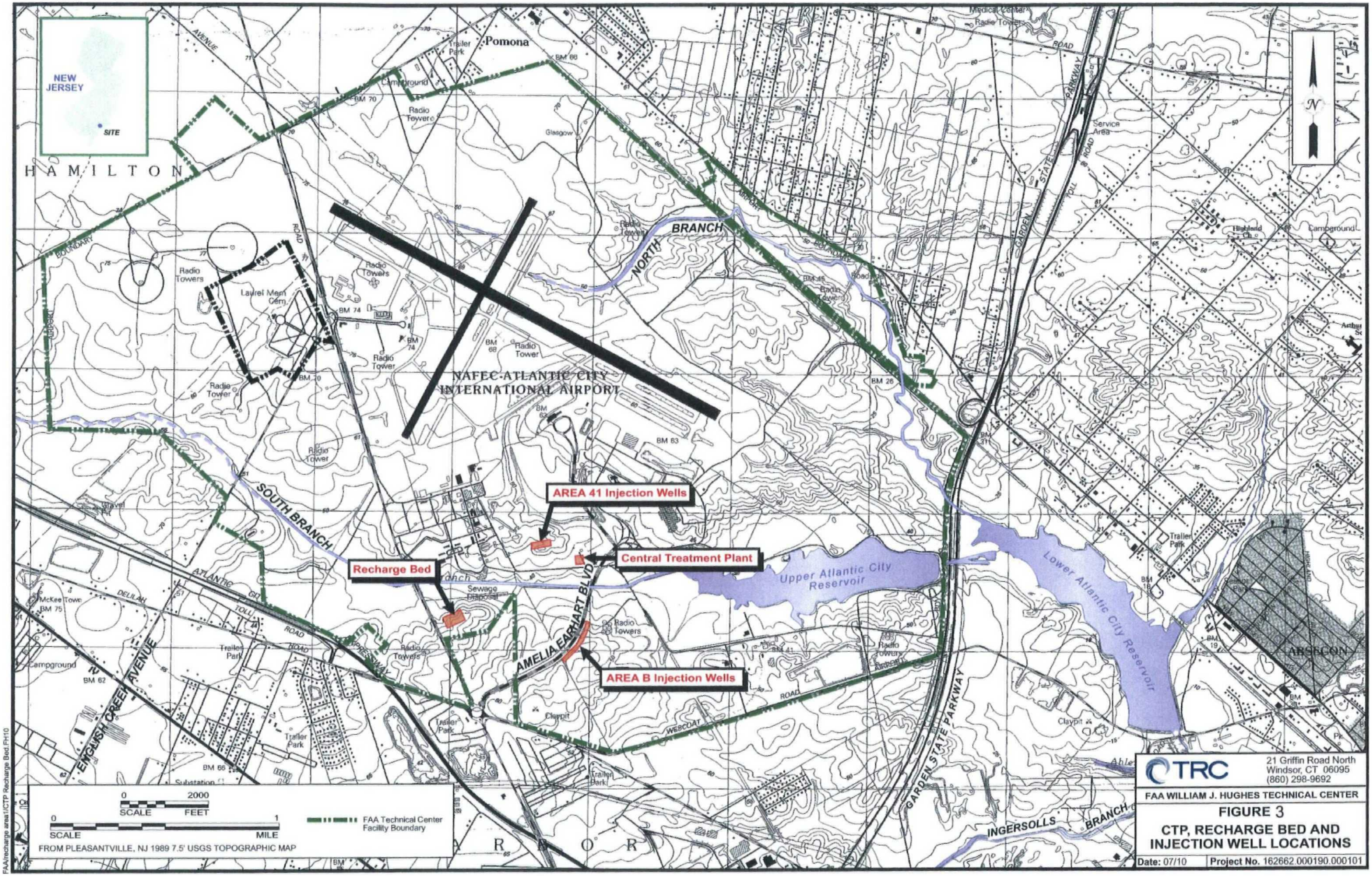
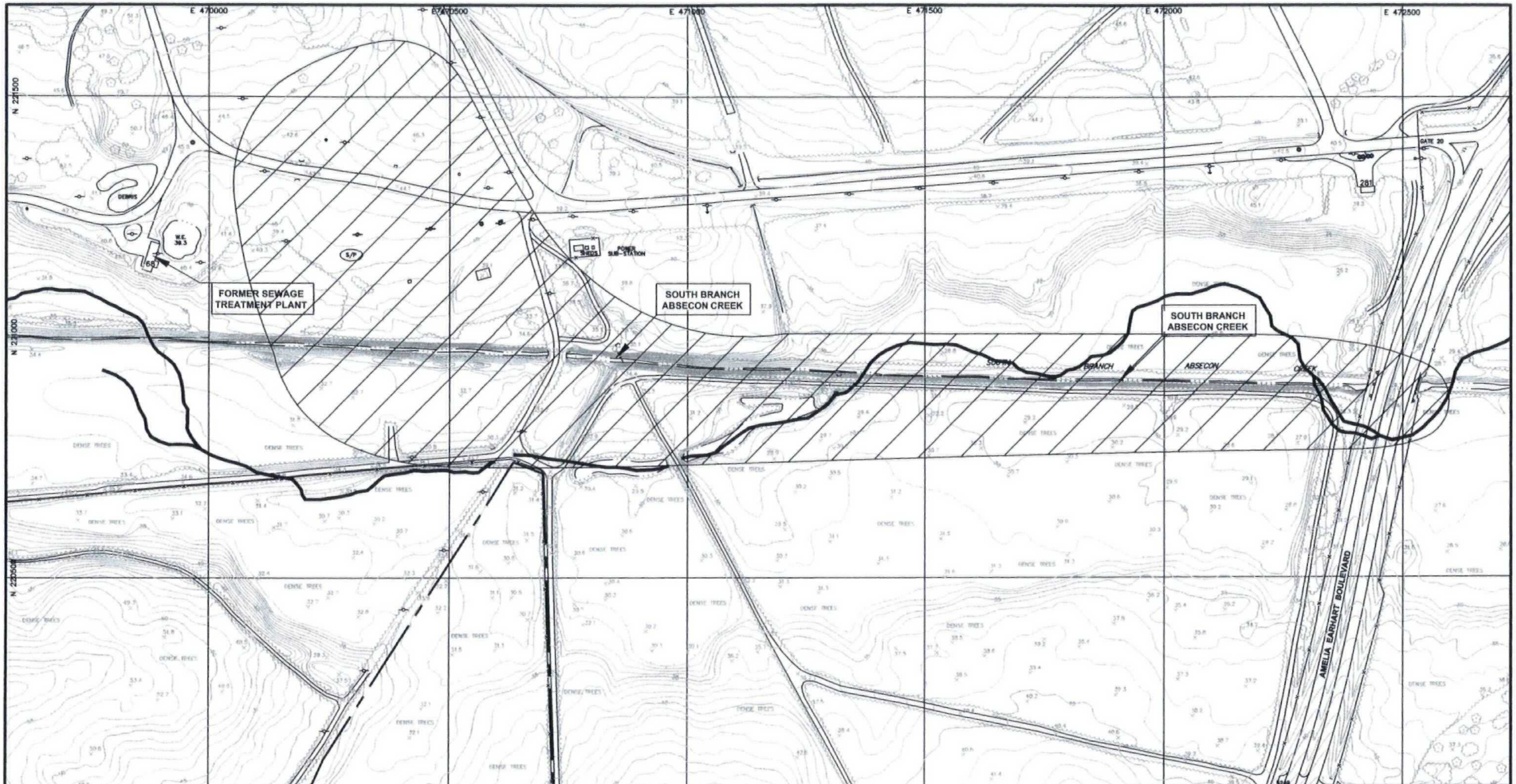
FEDERAL AVIATION ADMINISTRATION
FAA WILLIAM J. HUGHES TECHNICAL CENTER
ATLANTIC CITY AIRPORT, NEW JERSEY 08405

FIGURE 2
LOCATIONS OF AREAS B, D, U, AND W

J:\CAD\162662\000190\000101\
Figure 2.dwg Layout:Figure 2 October 06, 2010-1:26PM KHollenbeck



FAA/recharge area1/CTP Recharge Bed.FH10



NOTE:
DRAWING TAKEN FROM AERIAL MAP BY KUCERA INTERNATIONAL, INC.; DATE OF PHOTOGRAPHY– 4/9/94 & 4/14/94.

LEGEND

- PROPERTY BOUNDARY LINE
- FORMER STREAM CHANNEL
- CONCEPTUAL LIMITS OF AREA B

0 200' 400'
GRAPHIC SCALE

1983 NJ STATE

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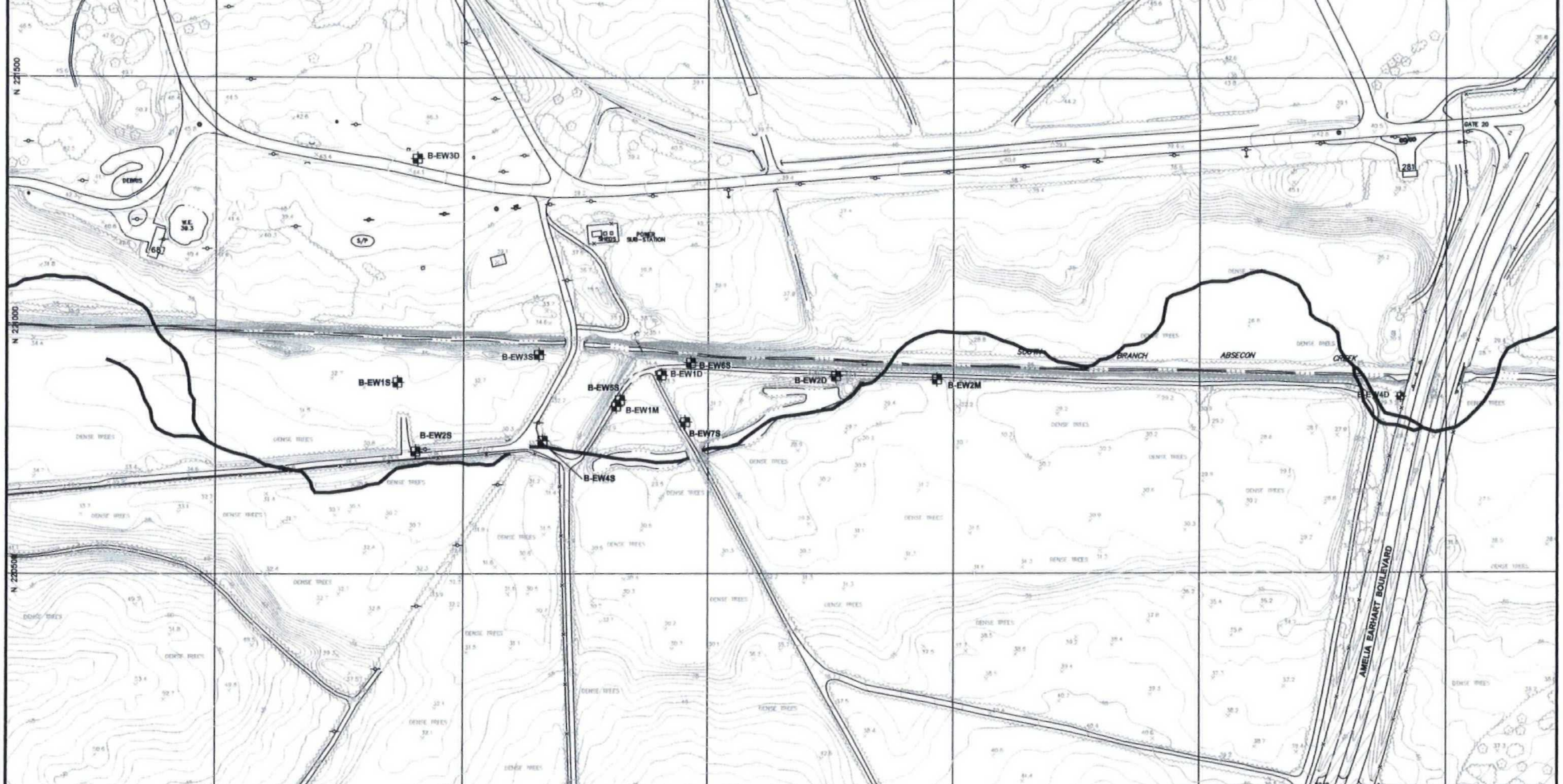
FIGURE 4
AREA B
SITE PLAN

J:\CAD\162662\000190\000101\
Fig 3 4 6 7 11–14.dwg Layout:Figure 3 October 06, 2010–11:56AM KHollenbeck



NOTE:
DRAWING TAKEN FROM AERIAL MAP BY KUCERA INTERNATIONAL, INC.; DATE OF PHOTOGRAPHY– 4/9/94 & 4/14/94.

LEGEND

B-EW1 EXTRACTION WELL LOCATION

FORMER STREAM CHANNEL

0 200' 400'

GRAPHIC SCALE

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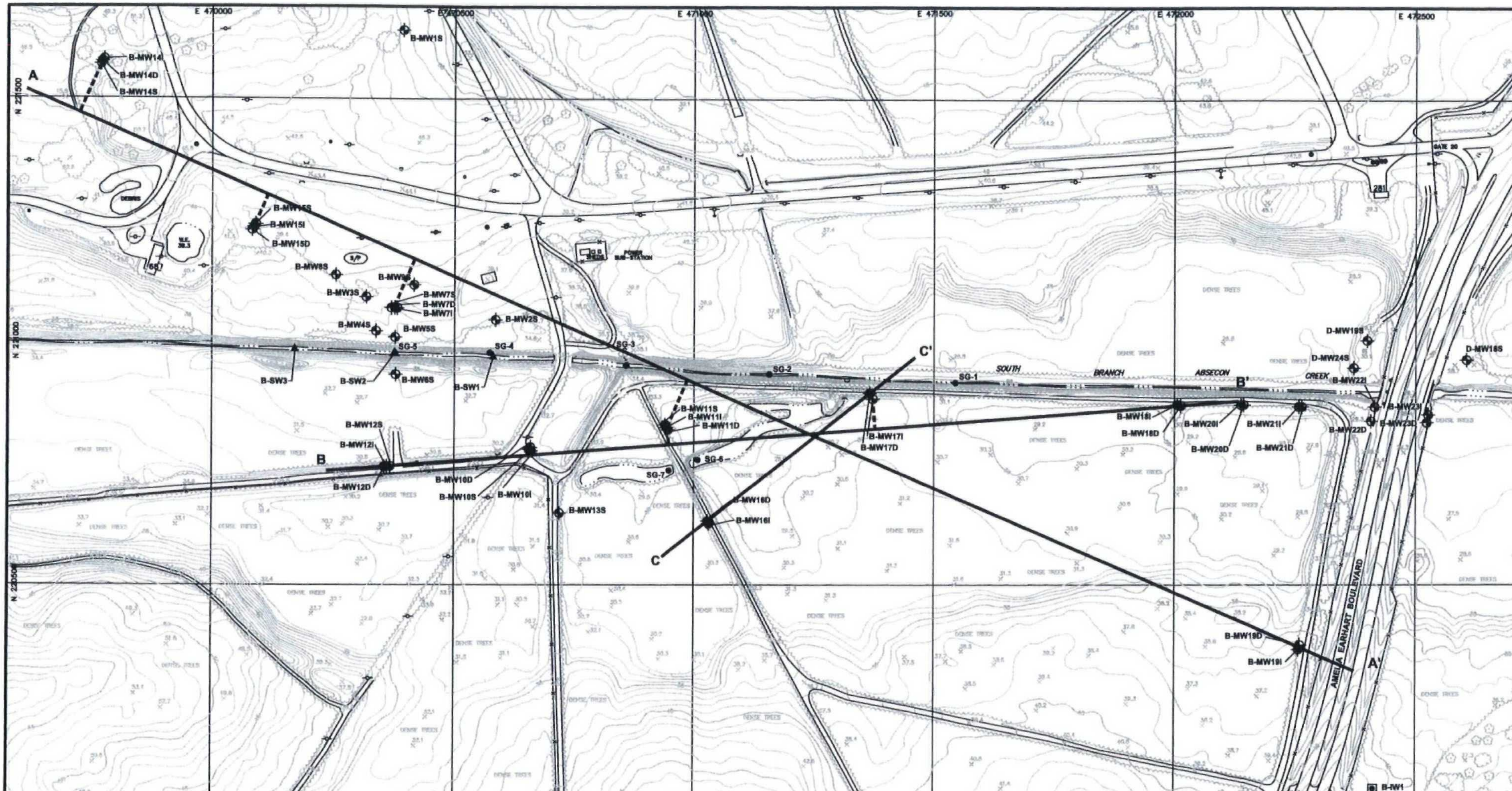
FIGURE 5
AREA B
EXTRACTION WELL LOCATIONS

J:\CAD\162662\000190\000101\
Fig 3 4 6 7 11-14.dwg Layout:Figure 4 October 06, 2010-11:56AM KHollenbeck



NOTE:
DRAWING TAKEN FROM AERIAL MAP BY KUCERA INTERNATIONAL, INC.; DATE OF PHOTOGRAPHY– 4/9/94 & 4/14/94.

LEGEND

B-MW15 MONITORING WELL LOCATION

0 200' 400'
GRAPHIC SCALE

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FIGURE 6
AREA B
GEOLOGIC CROSS-SECTION LOCATIONS

J:\CAD\162662\000190\000101\
Fig 2 3 6 7 11-14.dwg Layout:Figure 7 August 02, 2010–1:24PM Raloma

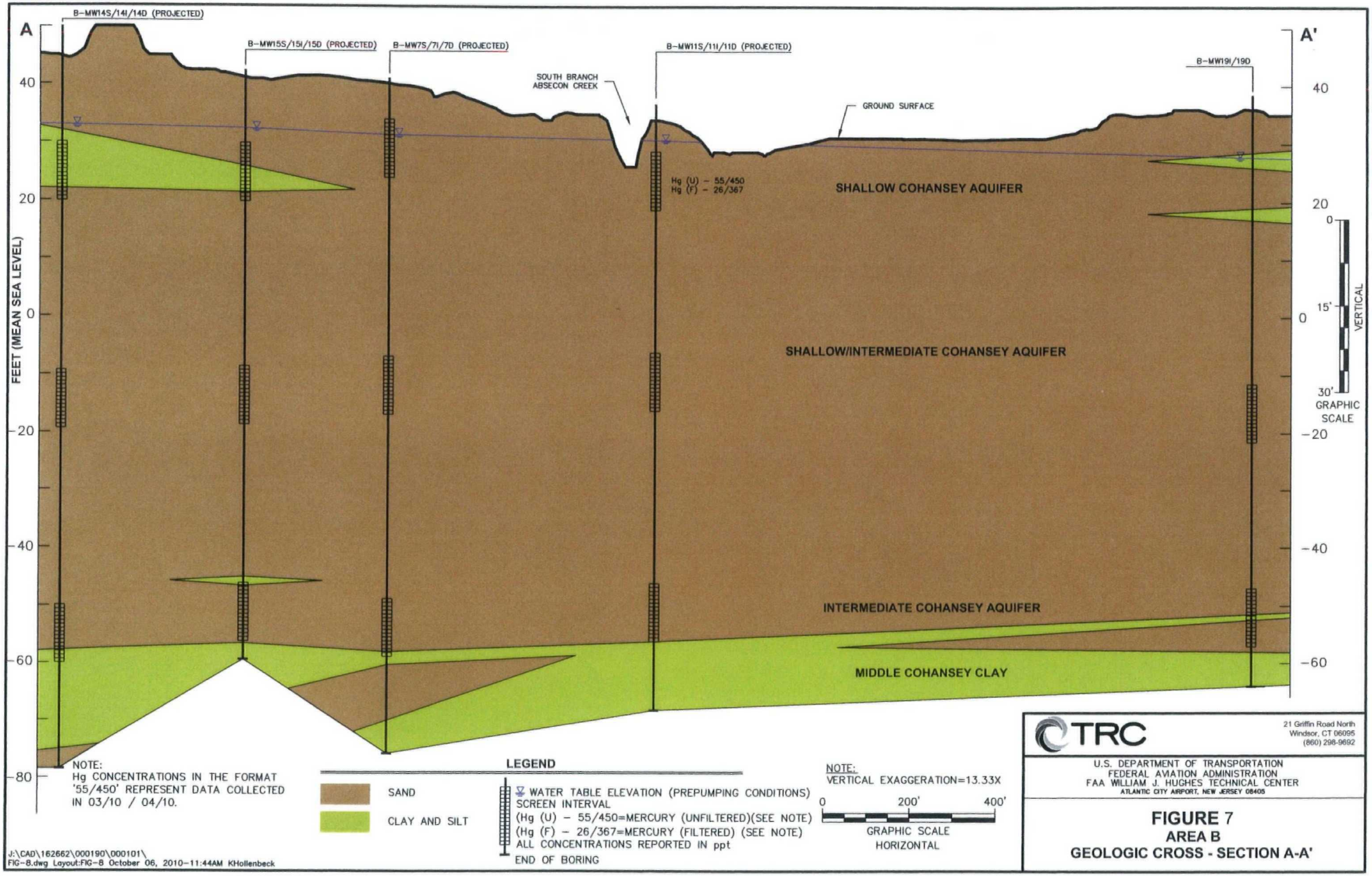

FIGURE 7
AREA B
GEOLOGIC CROSS - SECTION A-A'

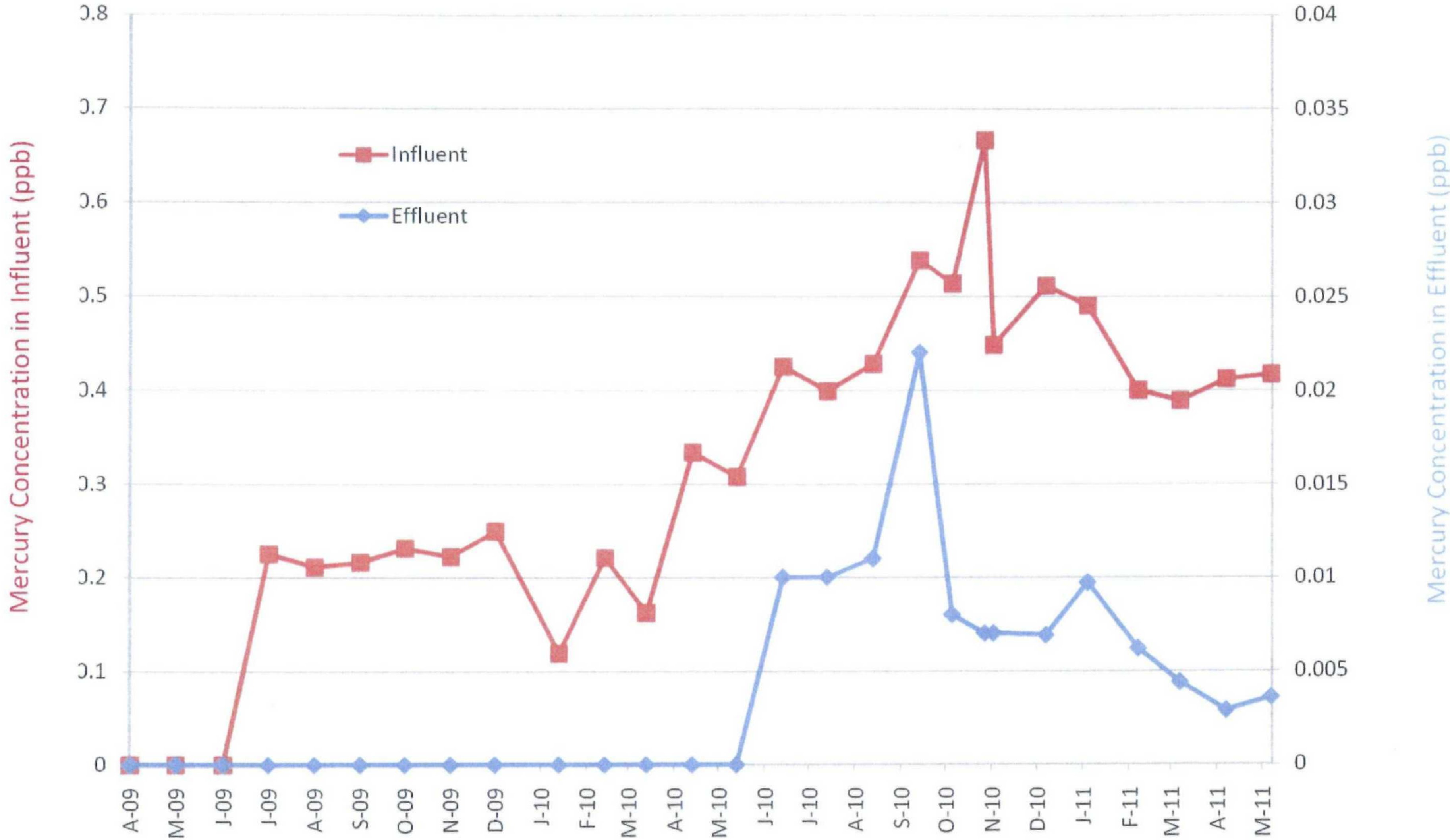

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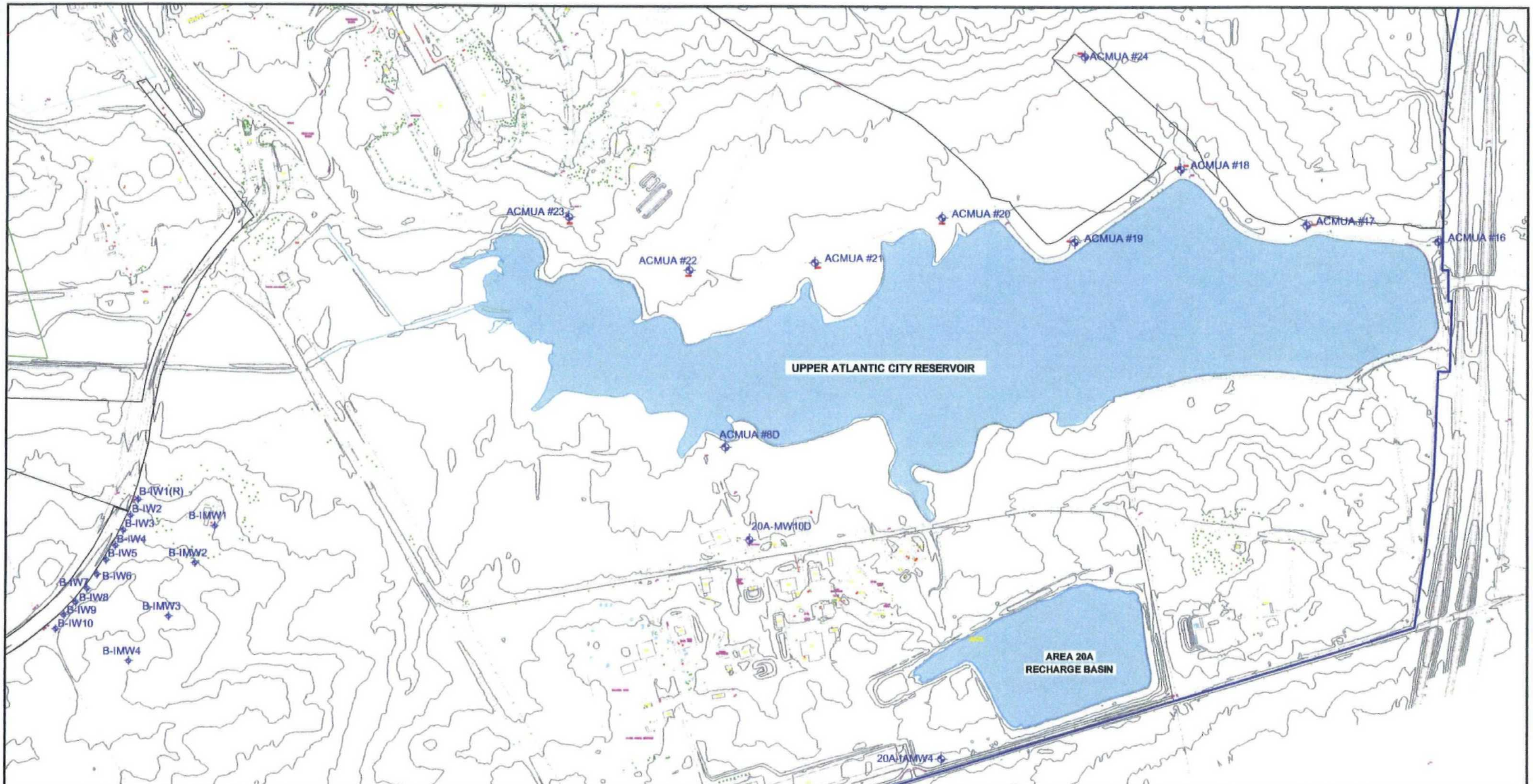
FIGURE 8

CTP MERCURY INFLUENT AND EFFLUENT

Date: 08/11	Project No. 162662.000230.000100



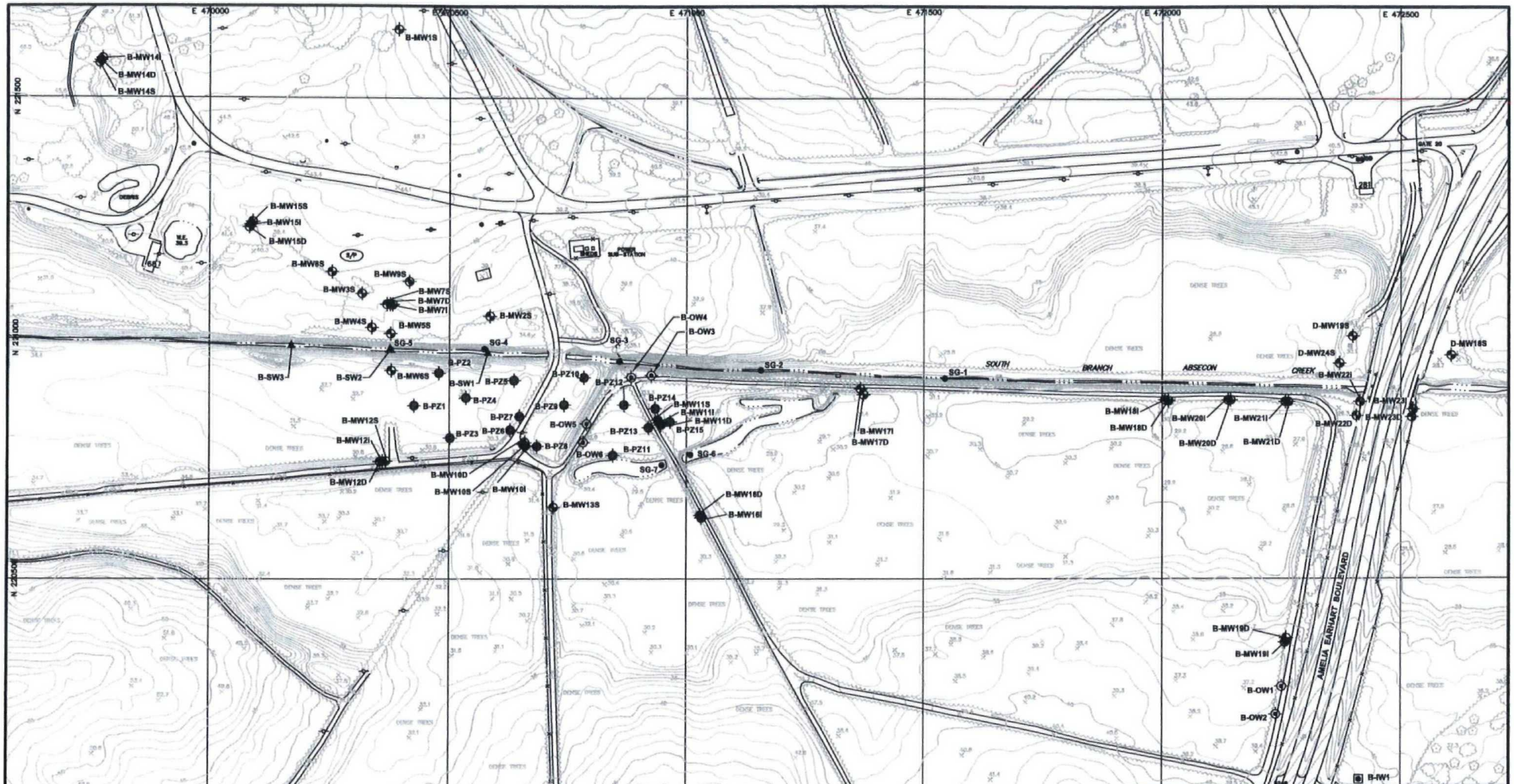
LEGEND:

ACMUA #23	Atlantic City Municipal Supply Well
B-IW3	Injection Well
B-IMW4	Injection Monitoring Well

ACMUA PRODUCTION WELL LOCATIONS

FAA WILLIAM J. HUGHES
TECHNICAL CENTER
ATLANTIC CITY INT'L AIRPORT, NJ

PROJECT NO.:	104146	DWG FILE: ACMUA WELL LOCATIONS	
DRAWN BY:	KS	DATE 6/23/11	
TRC		7761 SHAFFER PARKWAY SUITE 100 LITTLETON, CO 80127 (303) 792-5555	FIGURE: 9



NOTE:
DRAWING TAKEN FROM AERIAL MAP BY KUCERA INTERNATIONAL, INC.; DATE OF PHOTOGRAPHY– 4/9/94 & 4/14/94.

LEGEND

B-MW15	MONITORING WELL LOCATION
B-PZ1	PIEZOMETER LOCATION
B-OW1	OBSERVATION WELL LOCATION
B-IW1	INJECTION WELL LOCATION
SG-1	STREAM GAUGE LOCATION
B-SW1	SURFACE WATER LOCATION

0 200' 400'
GRAPHIC SCALE

N
W E
S
1983 NJ STATE

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FIGURE 10
AREA B
MONITORING WELLS, STREAM GAUGES, PIEZOMETERS, AND OBSERVATION WELLS

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Fig 2 3 6 7 11-14.dwg Layout:Figure 6 August 02, 2010–1:23PM Raloma

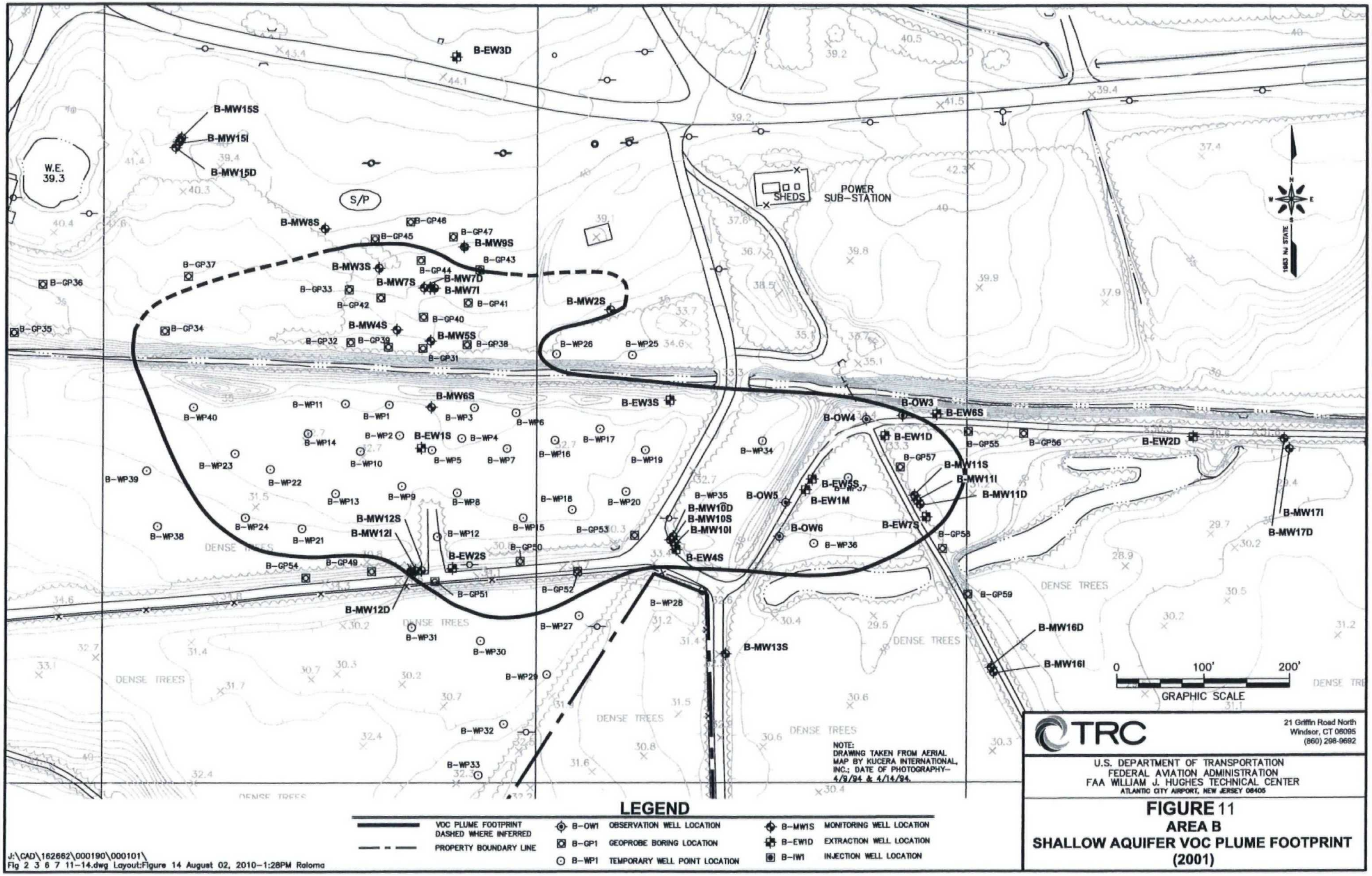

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FIGURE 11
AREA B
SHALLOW AQUIFER VOC PLUME FOOTPRINT
(2001)

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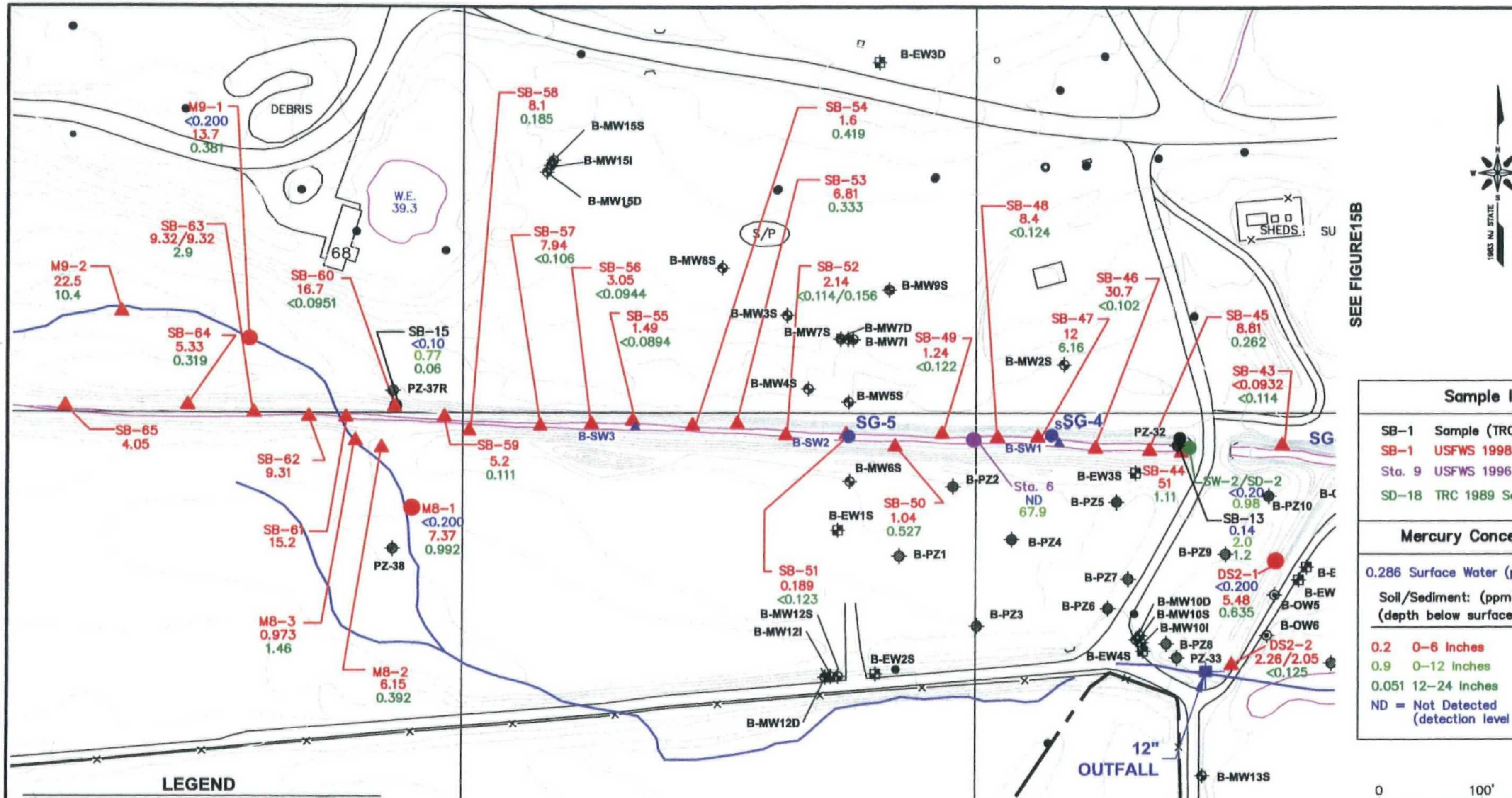
Fig 2 3 6 7 11-14.dwg Layout:Figure 14 August 02, 2010-1:28PM Raloma



SEE FIGURE15B

Sample ID

SB-1	Sample (TRC, 2000)
SB-1	USFWS 1998 Sample
Sta. 9	USFWS 1996 Sample
SD-18	TRC 1989 Sample

Mercury Concentration

0.286 Surface Water (ppb)

Soil/Sediment: (ppm)
(depth below surface)

0.2	0-6 Inches
0.9	0-12 Inches
0.051	12-24 Inches
ND =	Not Detected (detection level not provided)

0 100' 200'

GRAPHIC SCALE

LEGEND

FAA PROPERTY LINE	
SURFACE WATER/SEDIMENT SAMPLE	
SEDIMENT/SOIL SAMPLE	
SBAC STREAM CHANNEL 1957	
MONITORING WELL LOCATION	B-MW15
PIEZOMETER LOCATION	B-PZ1
EXTRACTION WELL LOCATION	B-EW1
OBSERVATION WELL LOCATION	B-OW1
INJECTION WELL LOCATION	B-IW1
STREAM GAUGE LOCATION	SG-1
SURFACE WATER LOCATION	B-SW1

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Fig 15-16.dwg Layout:Fig 15A August 02, 2010-1:51PM Raloma

HISTORIC DATA REFERENCES:

TRC, 2000 – PRELIMINARY ASSESSMENT/SITE INSPECTION–AREA U, SOUTH BRANCH ABSECON CREEK AND NORTH BRANCH ABSECON CREEK WATERSHEDS, FAA WILLIAM J. HUGHES TECHNICAL CENTER, ATLANTIC CITY AIRPORT, NEW JERSEY, FEBRUARY 2000.

TRC, 1989 – ENVIRONMENTAL INVESTIGATIVE/FEASIBILITY STUDY TECHNICAL REPORT, FAA WILLIAM J. HUGHES TECHNICAL CENTER, ATLANTIC CITY AIRPORT, NEW JERSEY, PHASE I, VOLUME 1, 2, AND 3 (REVISION 1), TRC ENVIRONMENTAL CORPORATION, MARCH 1989.

USFWS, 1998 – MERCURY IN SEDIMENT SOILS AND SURFACE WATER OF THE FEDERAL AVIATION ADMINISTRATION, WILLIAM J. HUGHES TECHNICAL CENTER, ATLANTIC COUNTY, NEW JERSEY, MARCH 1998.

USFWS, 1996 – ENVIRONMENTAL CONTAMINANTS IMPACT ANALYSIS AND ECOLOGICAL RISK ASSESSMENT FOR THE FEDERAL AVIATION ADMINISTRATION TECHNICAL CENTER CERCLA SITES IN ATLANTIC COUNTY, NEW JERSEY, APRIL 1996.

BASE MAP AND TOPOGRAPHY TAKEN FROM AERIAL MAP BY KUCERA INTERNATIONAL, DATE: 4/9/94 & 4/14/94.

TRC SI (2000)
MERCURY SPECIATION - SEDIMENT/SOIL

ANALTYE	Sample No.	Sample Interval (In)	Concentration (ppm)
Acid Labile Mercury	SB-13	0 - 12	5.99686
		12 - 24	0.18183
	SB-15	0 - 12	0.43052
		12 - 24	0.04068
Monomethyl Mercury	SB-13	0 - 12	0.042373
		12 - 24	0.000859
	SB-15	0 - 12	0.001074
		12 - 24	0.000065
Mercury Sulfide	SB-13	0 - 12	0.192685
		12 - 24	0.011891
	SB-15	0 - 12	0.01289
		12 - 24	0.011459

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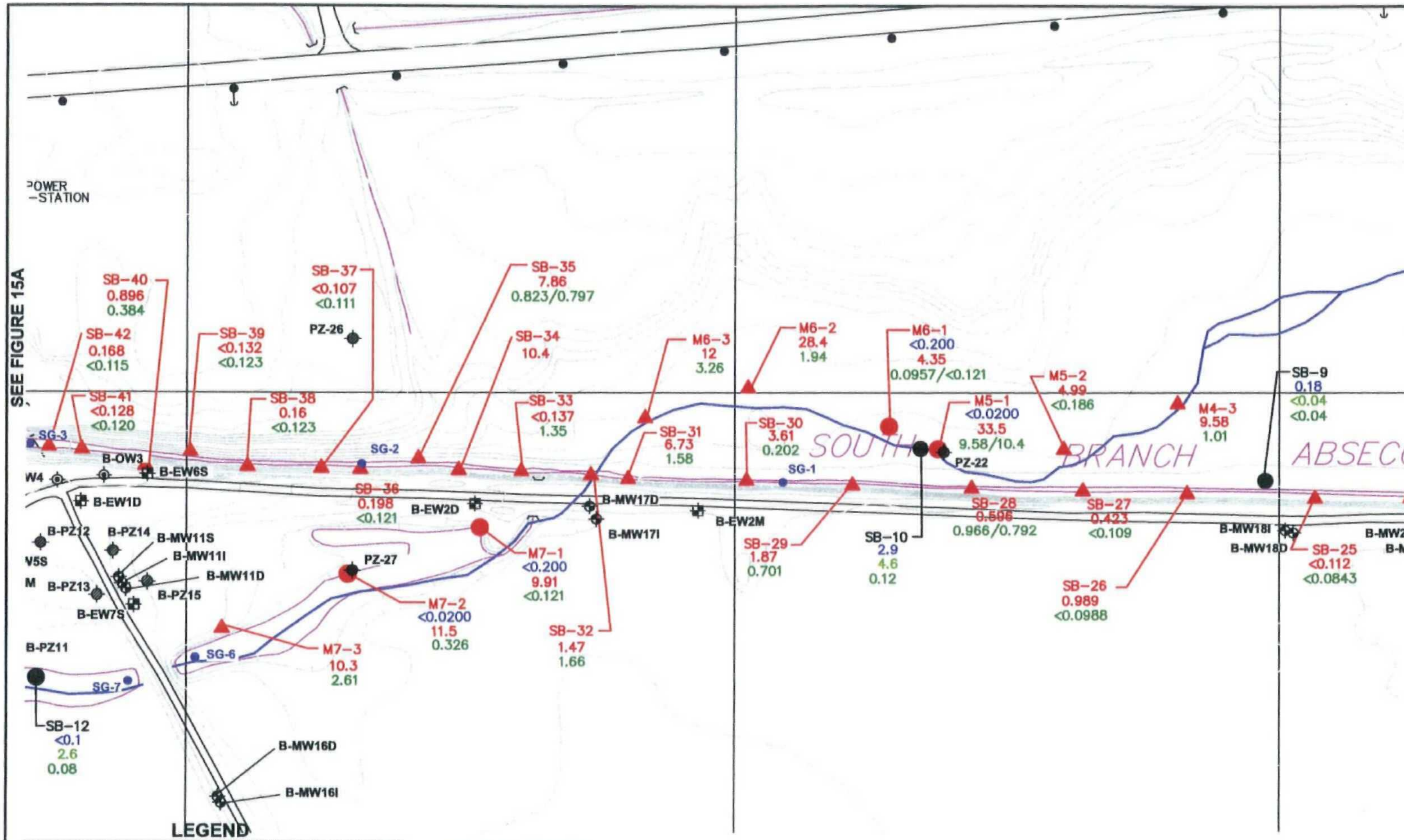
FIGURE 12A

SOUTH BRANCH-ABSECON CREEK
PRE-2001 MERCURY ANALYTICAL RESULT SUMMARY
SOUTH BRANCH AND MEANDER SEDIMENT SAMPLES



Sample ID	
SB-1	Sample (TRC, 2000)
SB-1	USFWS 1998 Sample

Mercury Concentration

0.286 Surface Water (ppb)

Soil/Sediment: (ppm)
(depth below surface)

0.2 0-6 Inches
0.9 0-12 Inches
0.051 12-24 Inches

0 100' 200'
GRAPHIC SCALE

LEGEND

FAA PROPERTY LINE	
SURFACE WATER/SEDIMENT SAMPLE	
SEDIMENT/SOIL SAMPLE	
SBAC STREAM CHANNEL 1957	
MONITORING WELL LOCATION	B-MW15
PIEZOMETER LOCATION	B-PZ1
EXTRACTION WELL LOCATION	B-EW1
OBSERVATION WELL LOCATION	B-OW1
INJECTION WELL LOCATION	B-IW1
STREAM GAUGE LOCATION	SG-1
SURFACE WATER LOCATION	B-SW1

HISTORIC DATA REFERENCES:

TRC, 2000 – PRELIMINARY ASSESSMENT/SITE INSPECTION–AREA U, SOUTH BRANCH ABSECON CREEK AND NORTH BRANCH ABSECON CREEK WATERSHEDS, FAA WILLIAM J. HUGHES TECHNICAL CENTER, ATLANTIC CITY AIRPORT, NEW JERSEY, FEBRUARY 2000.

USFWS, 1998 – MERCURY IN SEDIMENT SOILS AND SURFACE WATER OF THE FEDERAL AVIATION ADMINISTRATION, WILLIAM J. HUGHES TECHNICAL CENTER, ATLANTIC COUNTY, NEW JERSEY, MARCH 1998.

BASE MAP AND TOPOGRAPHY TAKEN FROM AERIAL MAP BY KUCERA INTERNATIONAL, DATE: 4/9/94 & 4/14/94.

TRC SI (2000)
MERCURY SPECIATION - SEDIMENT/SOIL

ANALTYE	Sample No.	Sample Interval (in)	Concentration (ppm)
Acid Labile Mercury	SB-10	0 - 12	4.5066
		12 - 24	0.07145
	SB-12	0 - 12	1.82114
		12 - 24	0.22746
Monomethyl Mercury	SB-10	0 - 12	0.024006
		12 - 24	0.00003
	SB-12	0 - 12	0.002643
		12 - 24	0.000144
Mercury Sulfide	SB-10	0 - 12	0.225737
		12 - 24	0.01205
	SB-12	0 - 12	0.025775
		12 - 24	0.011605

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FIGURE 12B

SOUTH BRANCH-ABSECON CREEK
PRE-2001 MERCURY ANALYTICAL RESULT SUMMARY
SOUTH BRANCH AND MEANDER SEDIMENT SAMPLES

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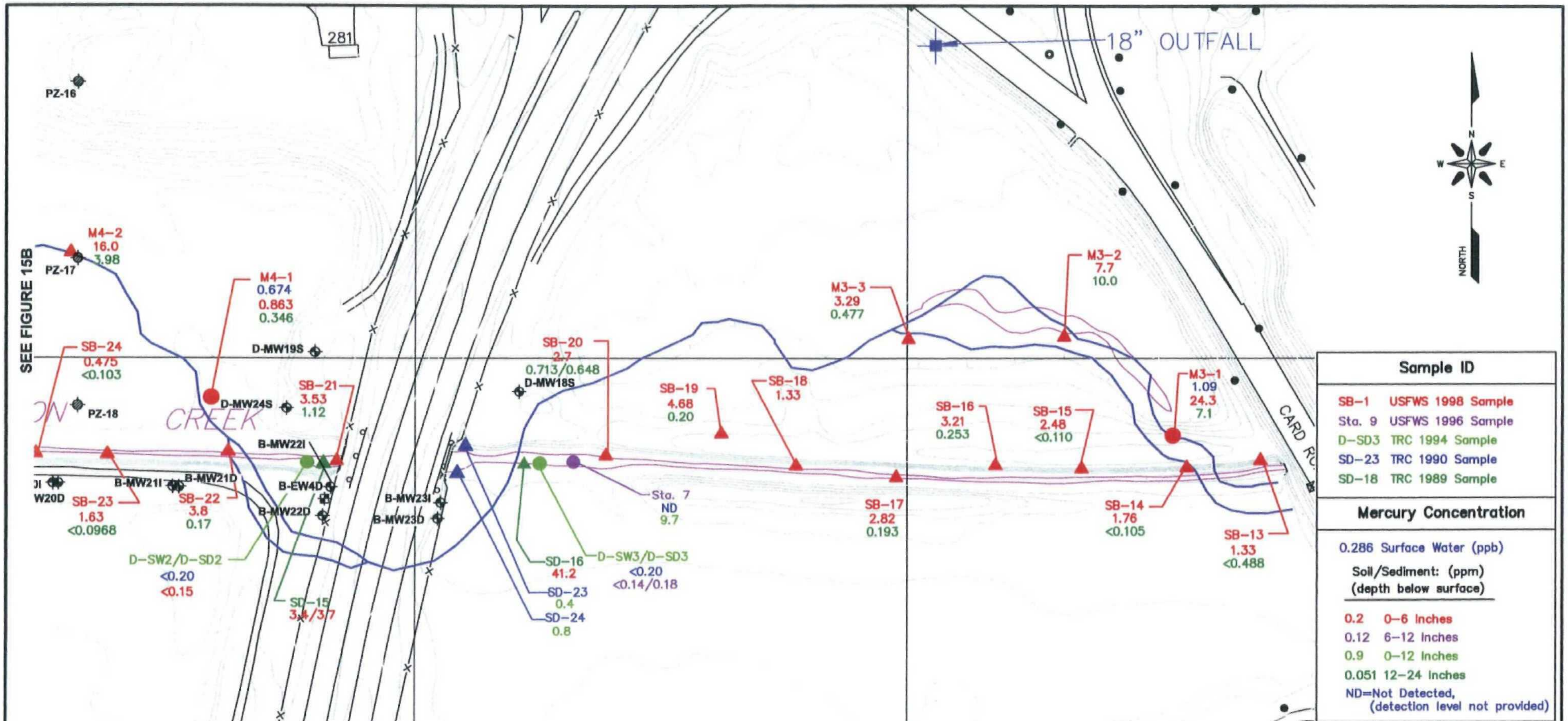
Fig 15–16.dwg Layout:Fig 15B August 02, 2010–1:52PM Raloma



LEGEND

- FAA PROPERTY LINE
- SURFACE WATER/SEDIMENT SAMPLE
- SEDIMENT/SOIL SAMPLE
- SBAC STREAM CHANNEL 1957
- MONITORING WELL LOCATION — B-MW15
- PIEZOMETER LOCATION — B-PZ1
- EXTRACTION WELL LOCATION — B-EW1
- OBSERVATION WELL LOCATION — B-OW1
- INJECTION WELL LOCATION — B-IW1
- STREAM GAUGE LOCATION — SG-1
- SURFACE WATER LOCATION — B-SW1

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Fig 15-16.dwg Layout:Fig 15C August 02, 2010-1:53PM Raloma

HISTORIC DATA REFERENCES:

TRC, 1994 - LETTER REPORT, MERCURY SAMPLING-AREA D AND WINZINGER'S LANDFILL, FEBRUARY 23 1994.

TRC, 1990 - ENVIRONMENTAL INVESTIGATIVE/FEASIBILITY STUDY SUPPLEMENTAL INVESTIGATION TECHNICAL REPORT, FAA TECHNICAL CENTER, ATLANTIC CITY AIRPORT, NEW JERSEY, MARCH 1990.

TRC, 1989 - ENVIRONMENTAL INVESTIGATIVE/FEASIBILITY STUDY TECHNICAL REPORT, FAA TECHNICAL CENTER, ATLANTIC CITY AIRPORT, NEW JERSEY, PHASE II INVESTIGATIONS, TRC ENVIRONMENTAL CORPORATION, MAY 1989.

USFWS, 1998 - MERCURY IN SEDIMENT SOILS AND SURFACE WATER OF THE FEDERAL AVIATION ADMINISTRATION, WILLIAM J. HUGHES TECHNICAL CENTER, ATLANTIC COUNTY, NEW JERSEY, MARCH 1998.

USFWS, 1996 - ENVIRONMENTAL CONTAMINANTS IMPACT ANALYSIS AND ECOLOGICAL RISK ASSESSMENT FOR THE FEDERAL AVIATION ADMINISTRATION TECHNICAL CENTER CERCLA SITES IN ATLANTIC COUNTY, NEW JERSEY, APRIL 1996.

BASE MAP AND TOPOGRAPHY TAKEN FROM AERIAL MAP BY KUCERA INTERNATIONAL, DATE: 4/9/94 & 4/14/94.

0 100' 200'
GRAPHIC SCALE

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FIGURE 12C

SOUTH BRANCH-ABSECON CREEK
PRE-2001 MERCURY ANALYTICAL RESULT SUMMARY
SOUTH BRANCH AND MEANDER SEDIMENT SAMPLES

Legend

- Sediment/Soil Sampling Location
- FAA Property Line
- SBAC Main Channel
- 1957 SBAC Stream Channel

Supplemental RI/ERA
Sediment/Soil Samples (depth below surface)
Laboratory Mercury Concentration (mg/kg)
0 to 6 inches
6 to 12 inches
0 to 12 inches
12 to 24 inches
Note: Duplicate concentrations in parentheses.

N
W E
S

0 175 350 700
Feet

Note: The orthophoto shown in this map was taken on March 19, 2001.

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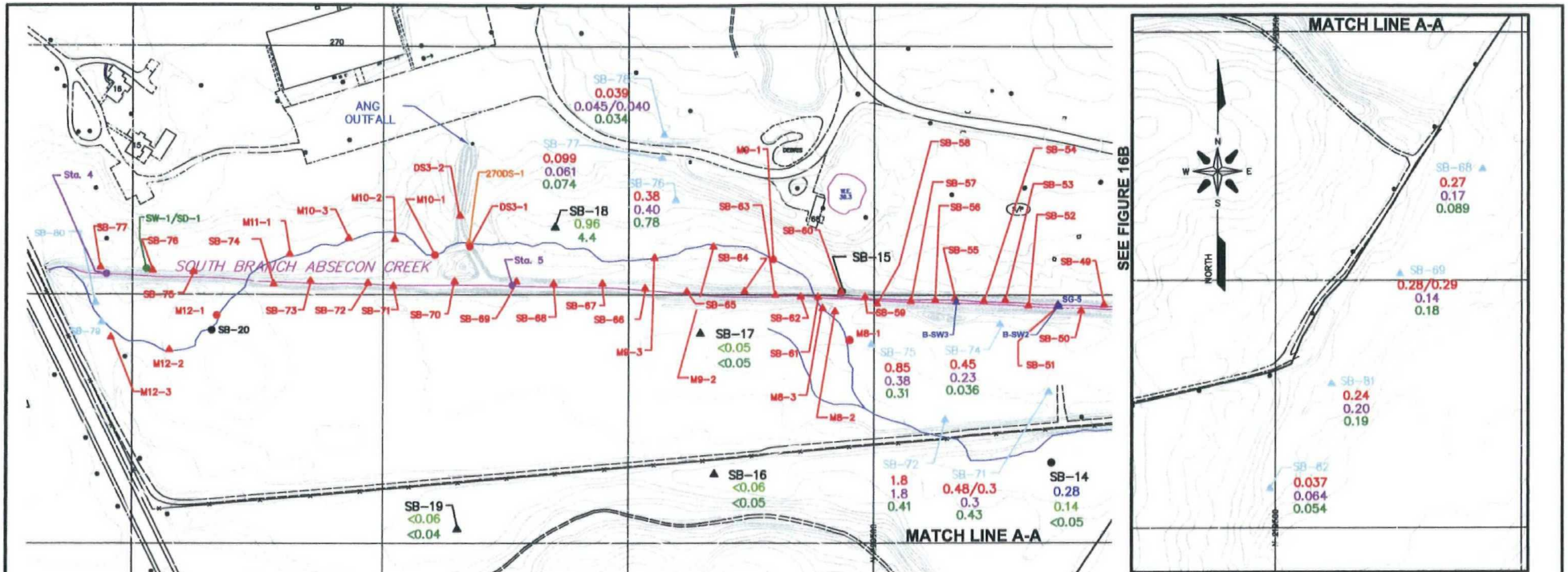
FIGURE 13
SBAC Main Channel/Abandoned Meander Hot Spot Sampling Mercury Results

T:\GIS-FAA\162662\000190\000101\Figure 17.mxd



TRC SI (2000) MERCURY SPECIATION - SOIL			
ANALTYE	Sample No.	Sample Interval (in)	Concentration (ppm)
Acid Labile Mercury	SB-17	0 - 12	0.045924
	SB-17 DUP	0 - 12	0.041221
Monomethyl Mercury	SB-17	0 - 12	0.000467
	SB-17 DUP	0 - 12	0.000174
Mercury Sulfide	SB-17	0 - 12	0.013235
	SB-17 DUP	0 - 12	0.013655

Sample ID		Mercury Concentration
SB-32	RI Sample (TRC)	0.286 Surface Water (ppb)
SB-1	SI Sample (TRC, 2000)	Soil/Sediment: (ppm) (depth below surface)
270 SD-1	Sample (TRC, 1998)	
SB-1	USFWS 1998 Sample	0.2 0-6 Inches
Sta. 9	USFWS 1996 Sample	0.12 6-12 Inches
SD-18	TRC 1989 Sample	0.9 0-12 Inches
		0.051 12-24 Inches

LEGEND

FAA PROPERTY LINE
SURFACE WATER/SEDIMENT SAMPLE
SEDIMENT/SOIL SAMPLE
SBAC STREAM CHANNEL 1957
MONITORING WELL LOCATION — B-MW15
PIEZOMETER LOCATION — B-PZ1
EXTRACTION WELL LOCATION — B-EW1
OBSERVATION WELL LOCATION — B-OW1
INJECTION WELL LOCATION — B-IW1
STREAM GAUGE LOCATION — SG-1
SURFACE WATER LOCATION — B-SW1

HISTORIC DATA REFERENCES:

TRC, 2000 – PRELIMINARY ASSESSMENT/SITE INSPECTION–AREA U, SOUTH BRANCH ABSECON CREEK AND NORTH BRANCH ABSECON CREEK WATERSHEDS, FAA WILLIAM J. HUGHES TECHNICAL CENTER, ATLANTIC CITY AIRPORT, NEW JERSEY, FEBRUARY 2000.

TRC, 1998 – MERCURY INVESTIGATION–SOIL AND SEDIMENT SAMPLING RESULTS, FAA WILLIAM J. HUGHES TECHNICAL CENTER, ATLANTIC CITY CITY AIRPORT, NEW JERSEY, TRC ENVIRONMENTAL CORPORATION, MAY 1998.

TRC, 1989 – ENVIRONMENTAL INVESTIGATIVE/FEASIBILITY STUDY TECHNICAL REPORT, FAA WILLIAM J. HUGHES TECHNICAL CENTER, ATLANTIC CITY AIRPORT, NEW JERSEY, PHASE I, VOLUME 1, 2, AND 3 (REVISION 1), TRC ENVIRONMENTAL CORPORATION, MARCH 1989.

USFWS, 1998 – MERCURY IN SEDIMENT SOILS AND SURFACE WATER OF THE FEDERAL AVIATION ADMINISTRATION, WILLIAM J. HUGHES TECHNICAL CENTER, ATLANTIC COUNTY, NEW JERSEY, MARCH 1998.

USFWS, 1996 – ENVIRONMENTAL CONTAMINANTS IMPACT ANALYSIS AND ECOLOGICAL RISK ASSESSMENT FOR THE FEDERAL AVIATION ADMINISTRATION TECHNICAL CENTER CERCLA SITES IN ATLANTIC COUNTY, NEW JERSEY, APRIL 1996.

BASE MAP AND TOPOGRAPHY TAKEN FROM AERIAL MAP BY KUCERA INTERNATIONAL, DATE: 4/9/94 & 4/14/94.

0 200' 400'
GRAPHIC SCALE

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FIGURE 14A
SOUTH BRANCH-ABSECON CREEK MERCURY ANALYTICAL RESULT SUMMARY FLOODPLAIN SEDIMENTSAMPLES

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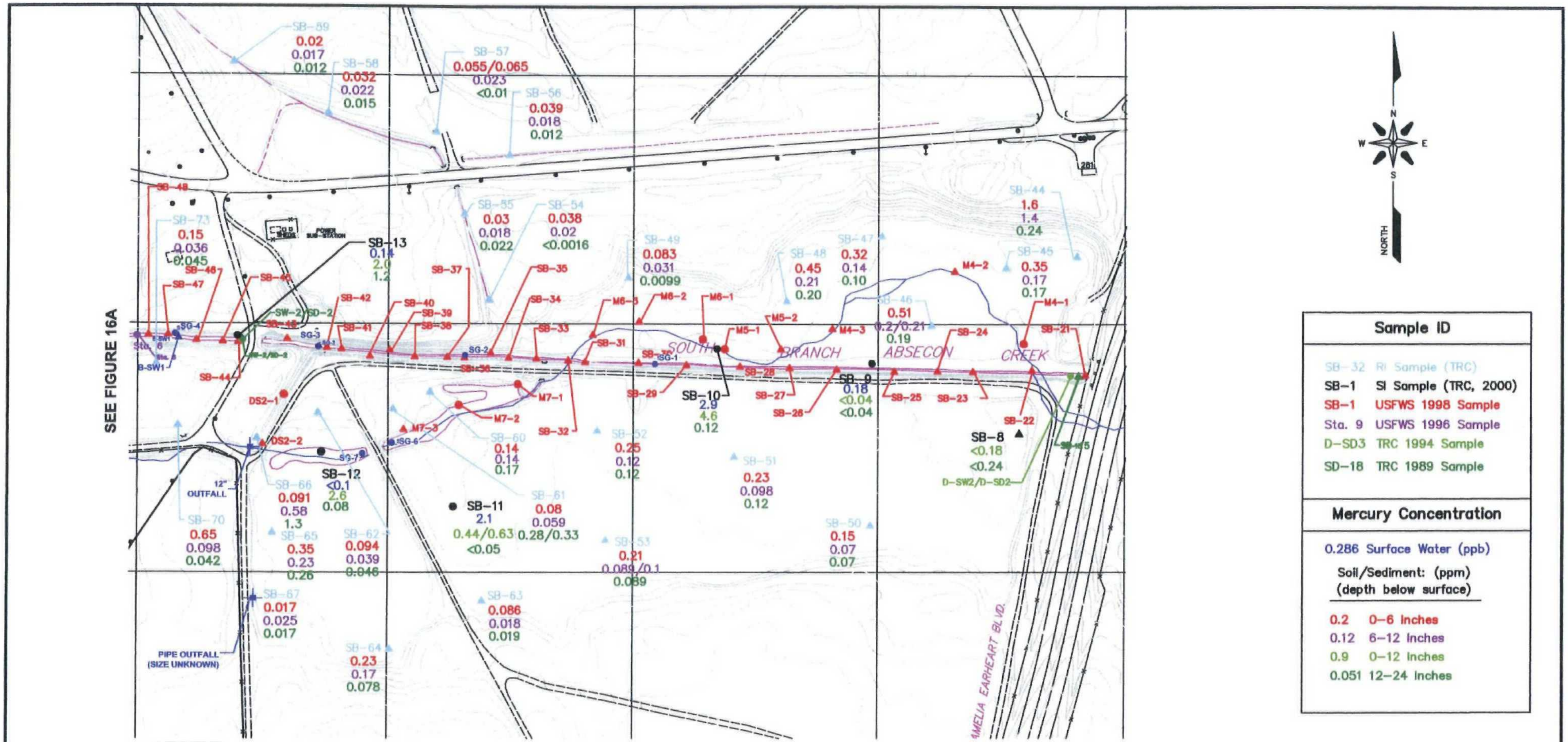
Fig 15-16.dwg Layout:Fig 16A August 02, 2010-1:56PM Raloma



LEGEND

FAA PROPERTY LINE	
SURFACE WATER/SEDIMENT SAMPLE	●
SEDIMENT/SOIL SAMPLE	▲
SBAC STREAM CHANNEL 1957	
MONITORING WELL LOCATION	B-MW15
PIEZOMETER LOCATION	B-PZ1
EXTRACTION WELL LOCATION	B-EW1
OBSERVATION WELL LOCATION	B-OW1
INJECTION WELL LOCATION	B-IW1
STREAM GAUGE LOCATION	SG-1
SURFACE WATER LOCATION	B-SW1

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Fig 15-16.dwg Layout:Fig 16B August 02, 2010-1:58PM Ralorna

HISTORIC DATA REFERENCES:

TRC, 2000 – PRELIMINARY ASSESSMENT/SITE INSPECTION-AREA U, SOUTH BRANCH ABSECON CREEK AND NORTH BRANCH ABSECON CREEK WATERSHEDS, FAA WILLIAM J. HUGHES TECHNICAL CENTER, ATLANTIC CITY AIRPORT, NEW JERSEY, FEBRUARY 2000.

TRC, 1994 – LETTER REPORT, MERCURY SAMPLING-AREA D AND WINZINGER'S LANDFILL, FEBRUARY 23 1994.

TRC, 1989 – ENVIRONMENTAL INVESTIGATIVE/FEASIBILITY STUDY TECHNICAL REPORT, FAA TECHNICAL CENTER, ATLANTIC CITY AIRPORT, NEW JERSEY, PHASE II INVESTIGATIONS, TRC ENVIRONMENTAL CORPORATION, MAY 1989.

TRC, 1989 – ENVIRONMENTAL INVESTIGATIVE/FEASIBILITY STUDY TECHNICAL REPORT, FAA WILLIAM J. HUGHES TECHNICAL CENTER, ATLANTIC CITY AIRPORT, NEW JERSEY, PHASE I, VOLUME 1, 2, AND 3 (REVISION 1), TRC ENVIRONMENTAL CORPORATION, MARCH 1989.

USFWS, 1998 – MERCURY IN SEDIMENT SOILS AND SURFACE WATER OF THE FEDERAL AVIATION ADMINISTRATION, WILLIAM J. HUGHES TECHNICAL CENTER, ATLANTIC COUNTY, NEW JERSEY, MARCH 1998.

USFWS, 1996 – ENVIRONMENTAL CONTAMINANTS IMPACT ANALYSIS AND ECOLOGICAL RISK ASSESSMENT FOR THE FEDERAL AVIATION ADMINISTRATION TECHNICAL CENTER CERCLA SITES IN ATLANTIC COUNTY, NEW JERSEY, APRIL 1996.

BASE MAP AND TOPOGRAPHY TAKEN FROM AERIAL MAP BY KUCERA INTERNATIONAL, DATE: 4/9/94 & 4/14/94.

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FIGURE 14B

SOUTH BRANCH-ABSECON CREEK MERCURY ANALYTICAL RESULT SUMMARY FLOODPLAIN SEDIMENT SAMPLES

NOTES:

1) DRAWING TAKEN FROM AERIAL MAP BY KUCERA INTERNATIONAL, INC.; DATE OF PHOTOGRAPHY- 4/9/94 & 4/14/94.

2) UNFILTERED AND FILTERED ALIQUOTS WERE OBTAINED FROM EACH MICROWELL. MERCURY RESULTS ARE PRESENTED IN ppb FOR THE UNFILTERED ALIQUOTS; MERCURY WAS NOT DETECTED IN ANY FILTERED ALIQUOT.

3) "B" CONCENTRATION IS BELOW THE CONTRACT – REQUIRED DETECTION LIMIT BUT ABOVE THE INSTRUMENT DETECTION LIMIT.

LEGEND

B-MW-15 MONITORING WELL LOCATION

B-GP1 GEOPROBE GROUNDWATER

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FIG-18.dwg Layout:FIG-18 August 02, 2010-1:17PM Raloma

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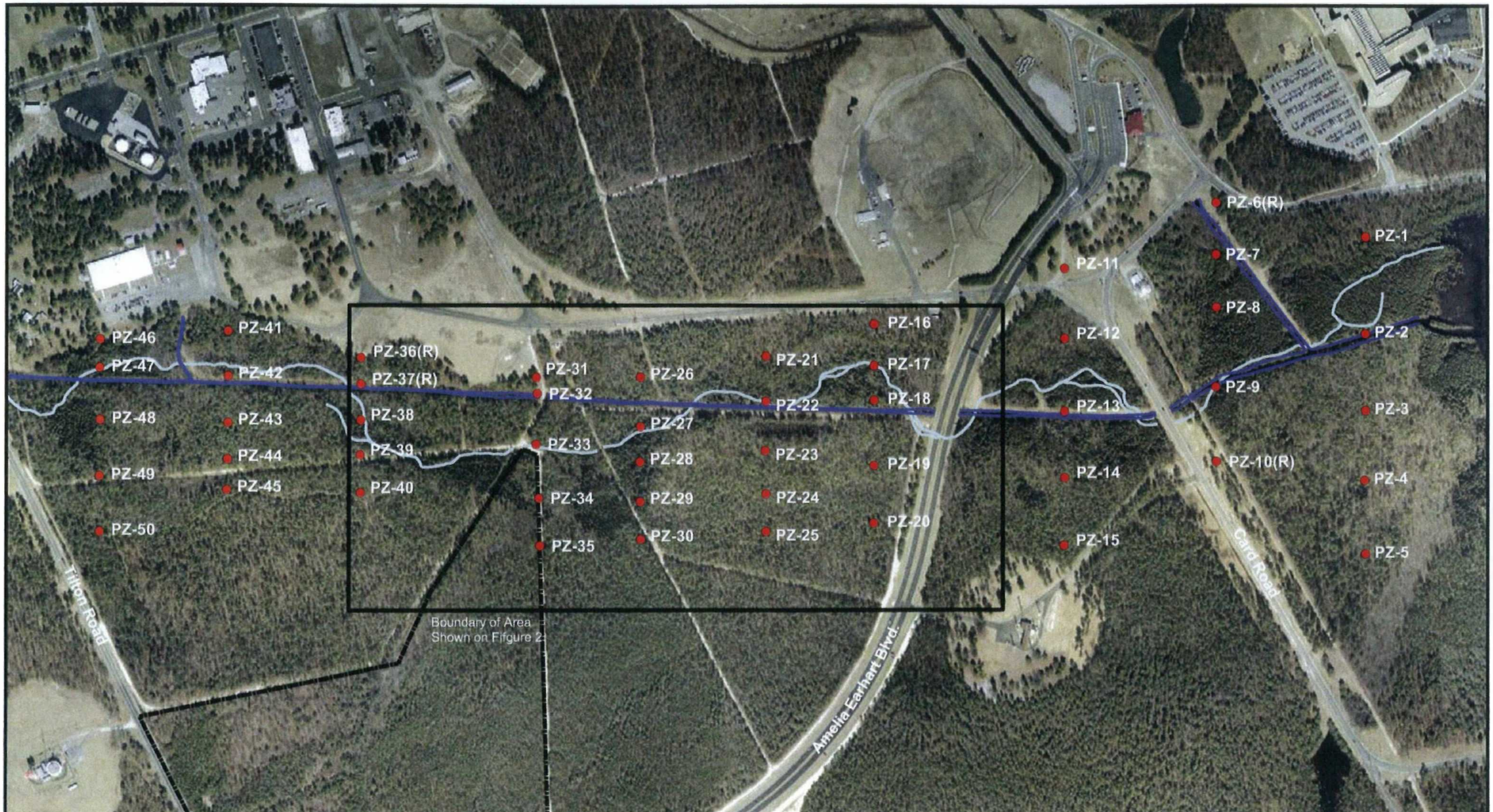
FIGURE 15

AREA B - PRE-REMEDIAL DESIGN ACTIVITIES MICROWELL GROUNDWATER SAMPLE LOCATIONS AND MERCURY ANALYTICAL RESULTS (JULY 1999)



Legend

- Piezometer Location
- FAA Property Line
- SBAC Main Channel
- 1957 SBAC Stream Channel/Tributaries
- (R) Replacement Piezometer

N
W E
S

0 200 400 800
Feet

Note: The orthophoto shown in this map was taken on March 19, 2001.

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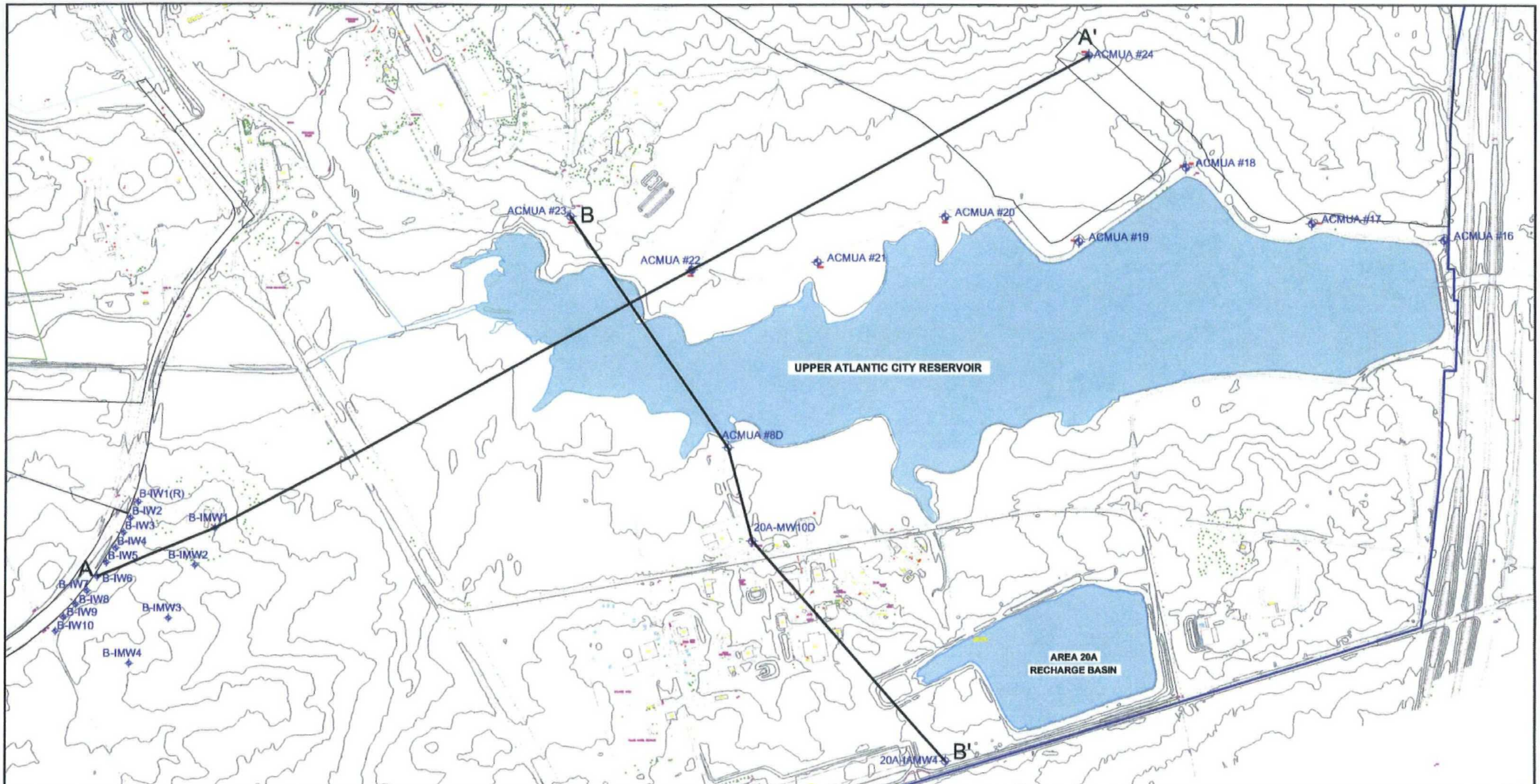
FIGURE 16
Piezometer Locations

T:\GIS-FAA\162662\000190\000101\Figure 19.mxd



LEGEND:

A ____ A'	Location of Geologic Cross section
ACMUA #23	Atlantic City Municipal Supply Well
B-IW3	Injection Well
B-IMW4	Injection Monitoring Well
20A-1AMW4	Area 20A Monitoring Well

N

SCALE
0 600' 1200'

CROSS-SECTION LOCATION MAP

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ATLANTIC CITY INT'L AIRPORT, NJ

PROJECT NO.:	104146	DWG FILE: Fig. 5 XS Location Map	
DRAWN BY:	KS	DATE	1/04/10
TRC		7761 SHAFFER PARKWAY SUITE 100 LITTLETON, CO 80127 (303) 792-5555	FIGURE: 17

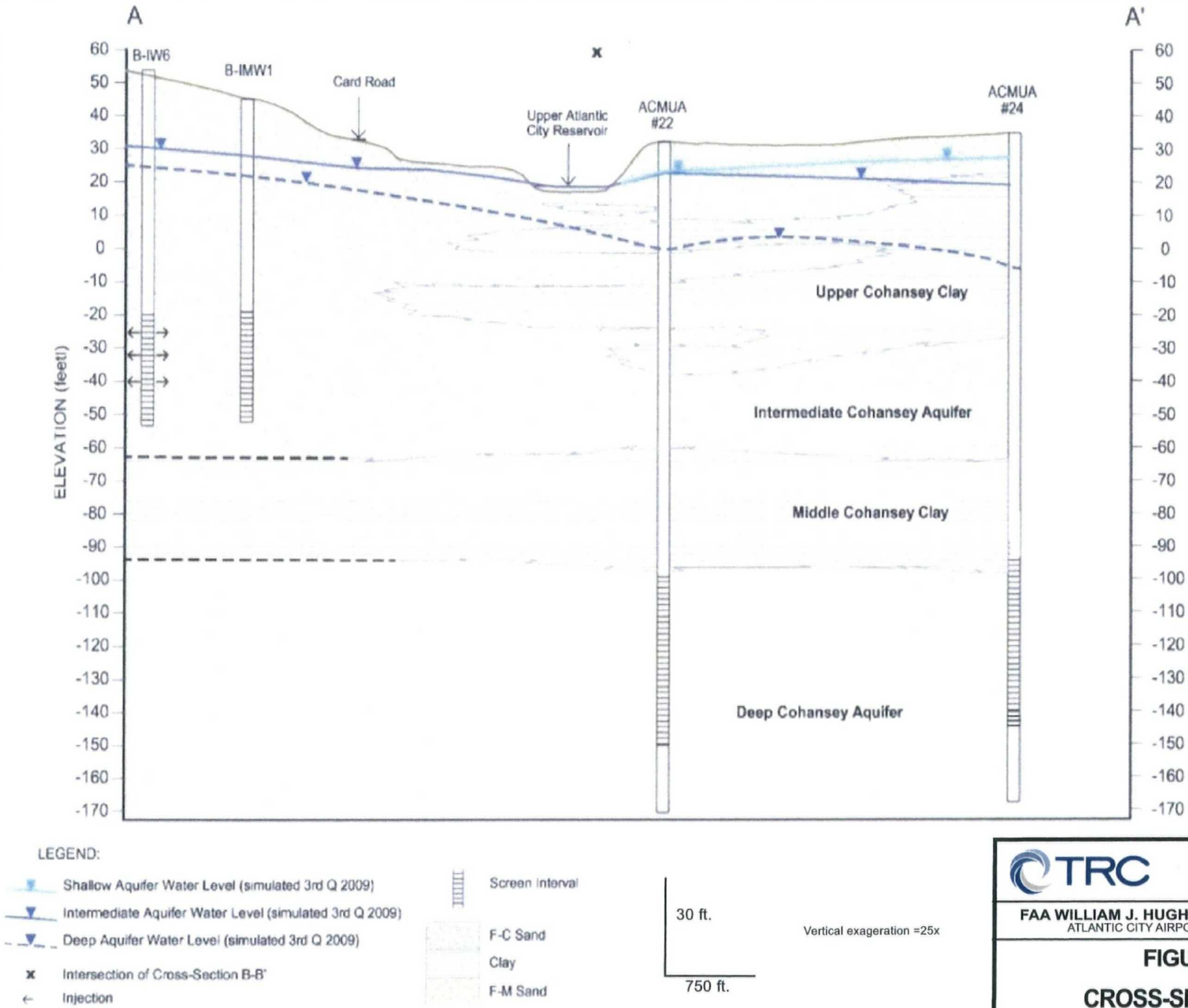

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FIGURE 18

CROSS-SECTION A-A'

Date: 08/11 | Project No. 162662.000230.000100

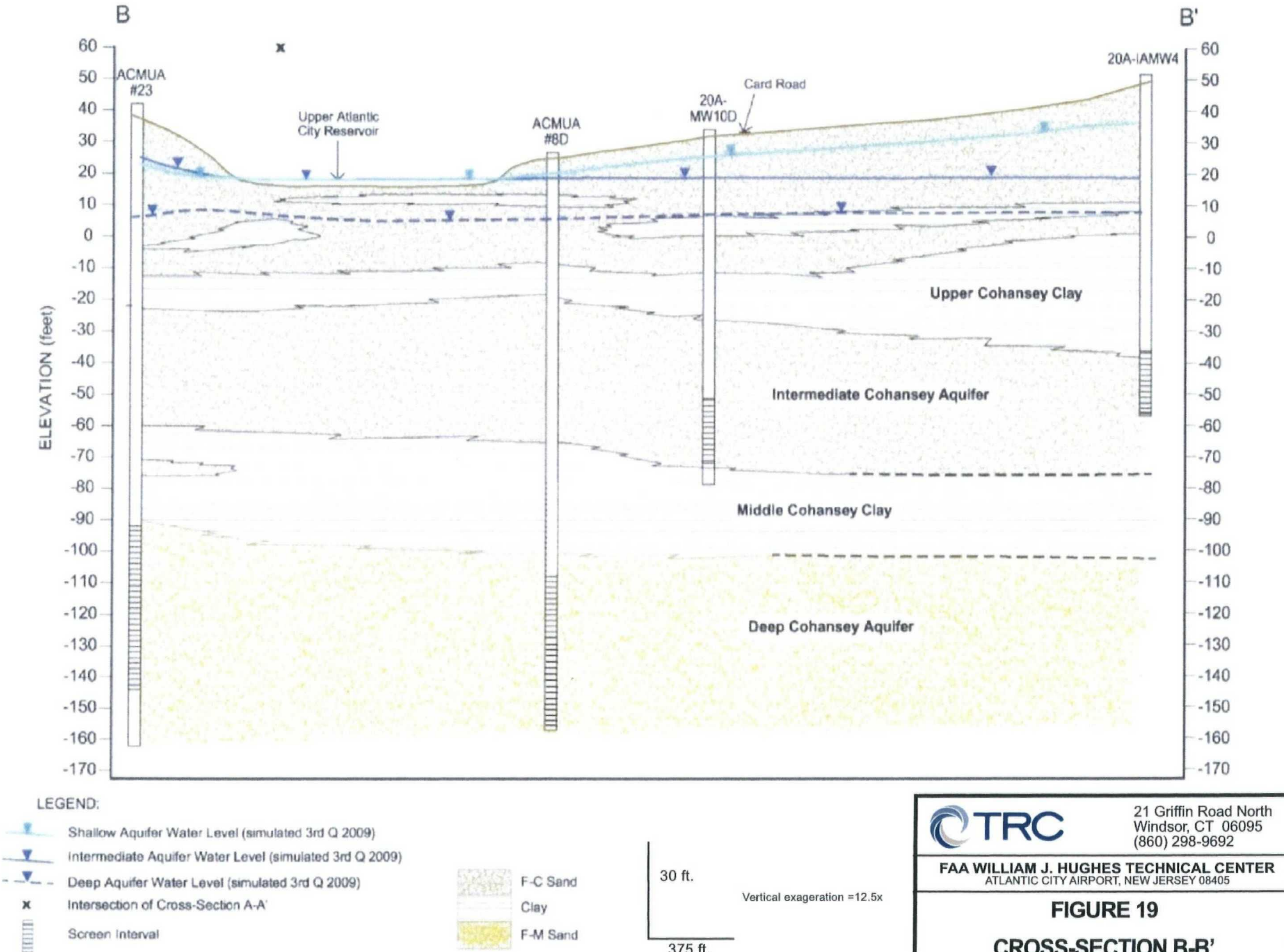

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FIGURE 19

CROSS-SECTION B-B'

Date: 08/11 | Project No. 162662.000230.000100

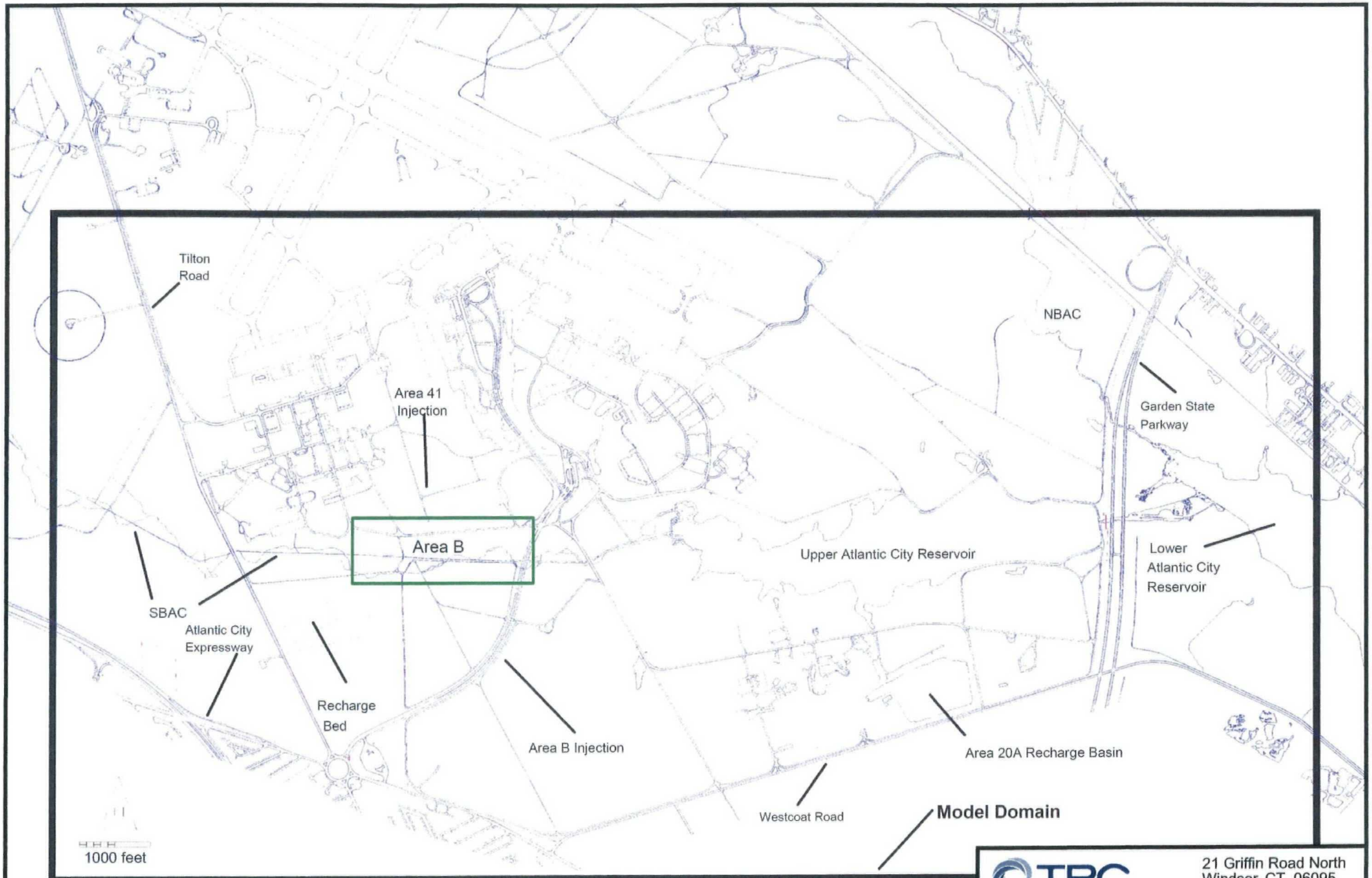

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FIGURE 20
MODEL DOMAIN

Date: 08/11 | Project No. 162662.000230.000100

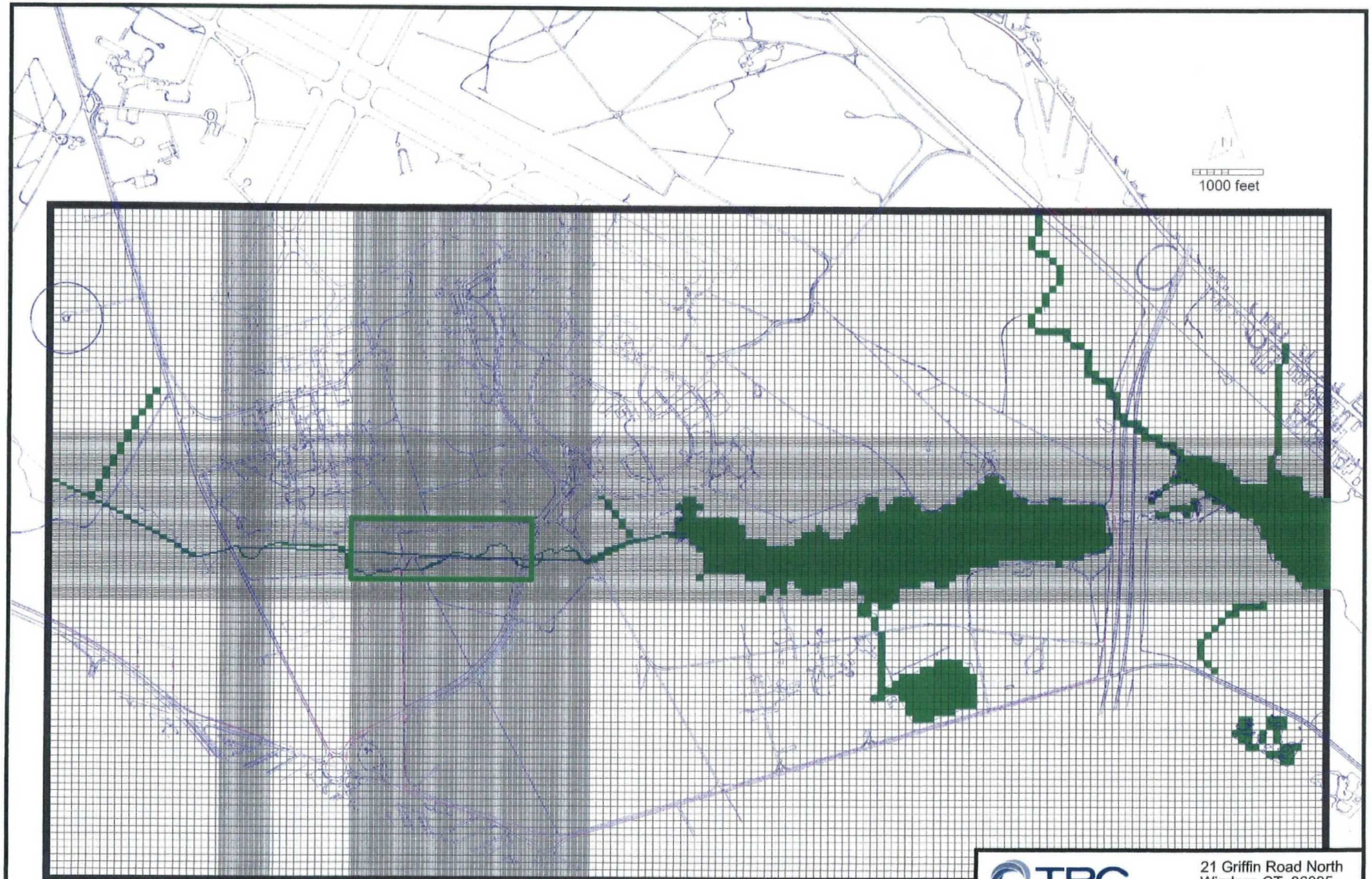

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FIGURE 21
FINITE-DIFFERENCE GRID

Date: 08/11 | Project No. 162662.000230.000100

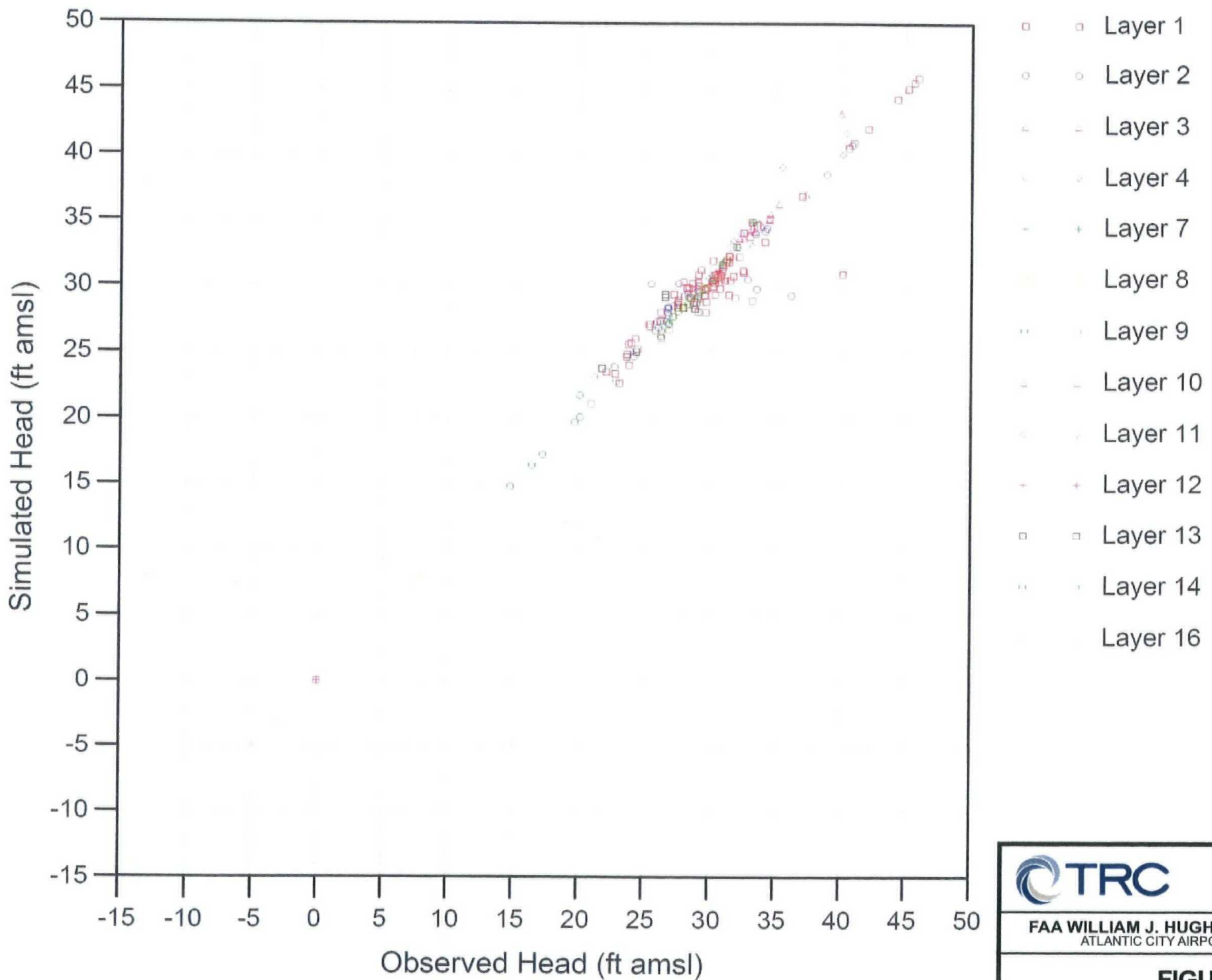

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FIGURE 22
FLOW MODEL CALIBRATION/ VERIFICATION

Date: 08/11 | Project No. 162662.000230.000100

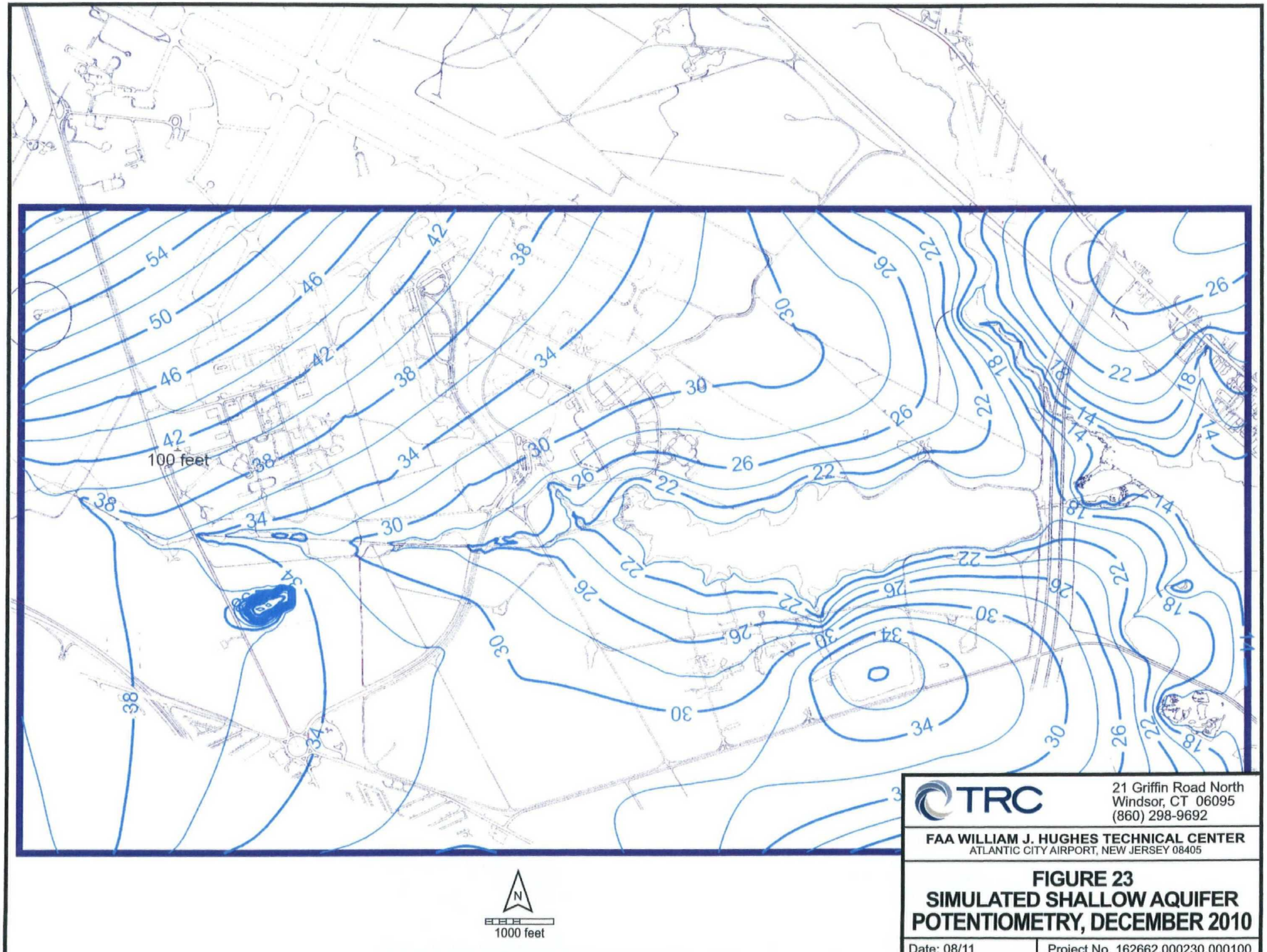

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FIGURE 23
SIMULATED SHALLOW AQUIFER POTENTIOMETRY, DECEMBER 2010

Date: 08/11 | Project No. 162662.000230.000100

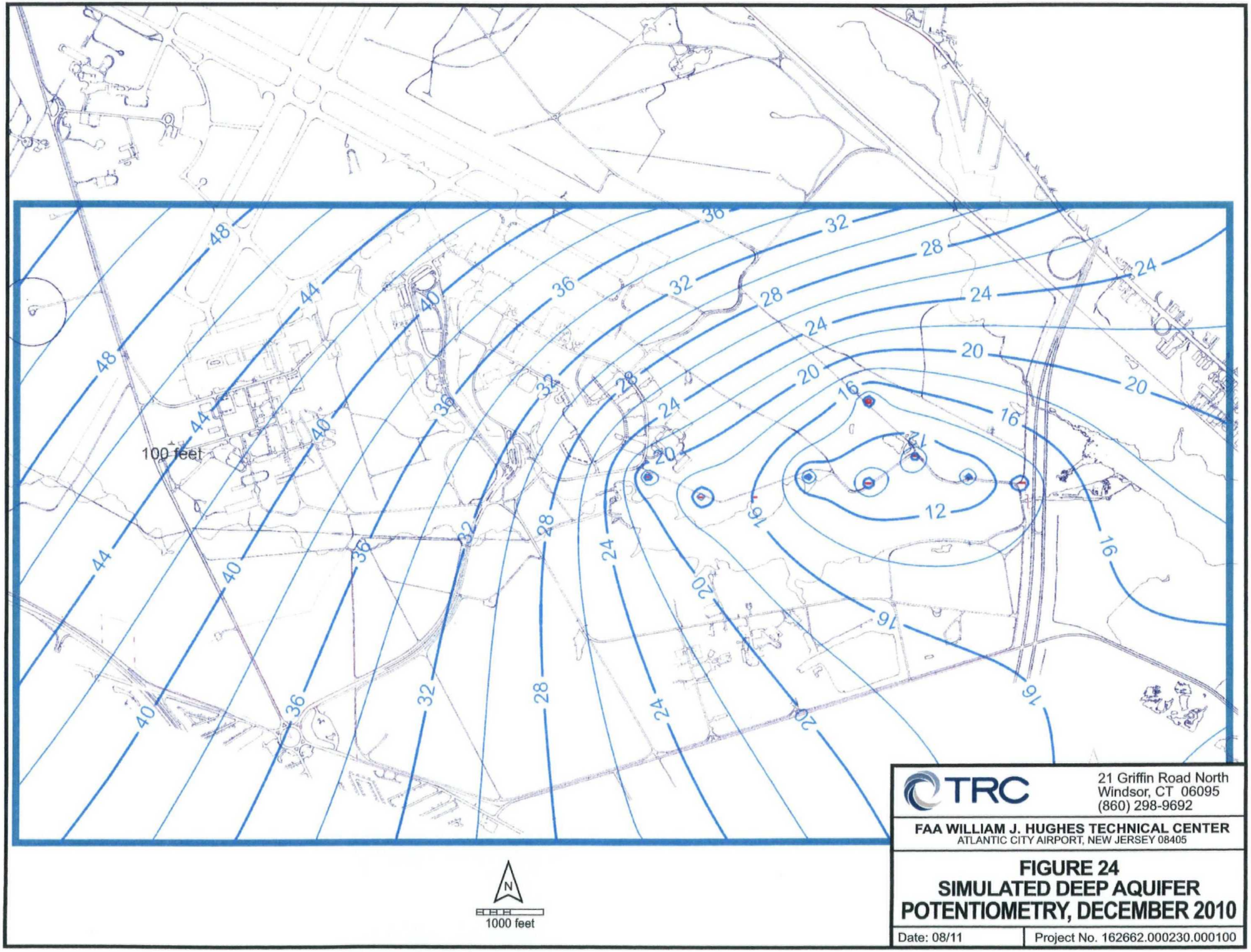

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FIGURE 24
SIMULATED DEEP AQUIFER POTENTIOMETRY, DECEMBER 2010

Date: 08/11	Project No. 162662.000230.000100

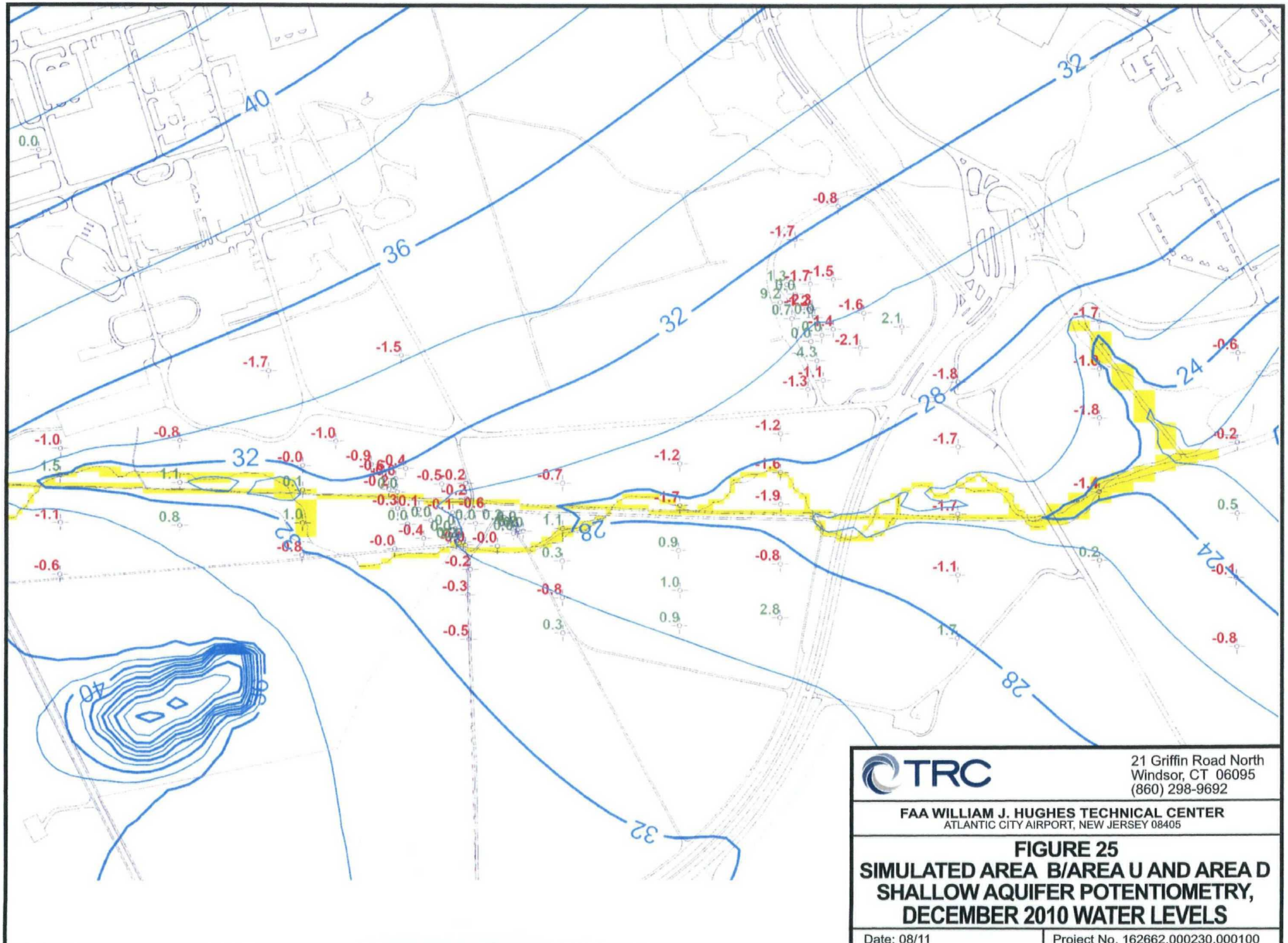

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FIGURE 25
SIMULATED AREA B/AREA U AND AREA D SHALLOW AQUIFER POTENTIOMETRY, DECEMBER 2010 WATER LEVELS

Date: 08/11 | Project No. 162662.000230.000100

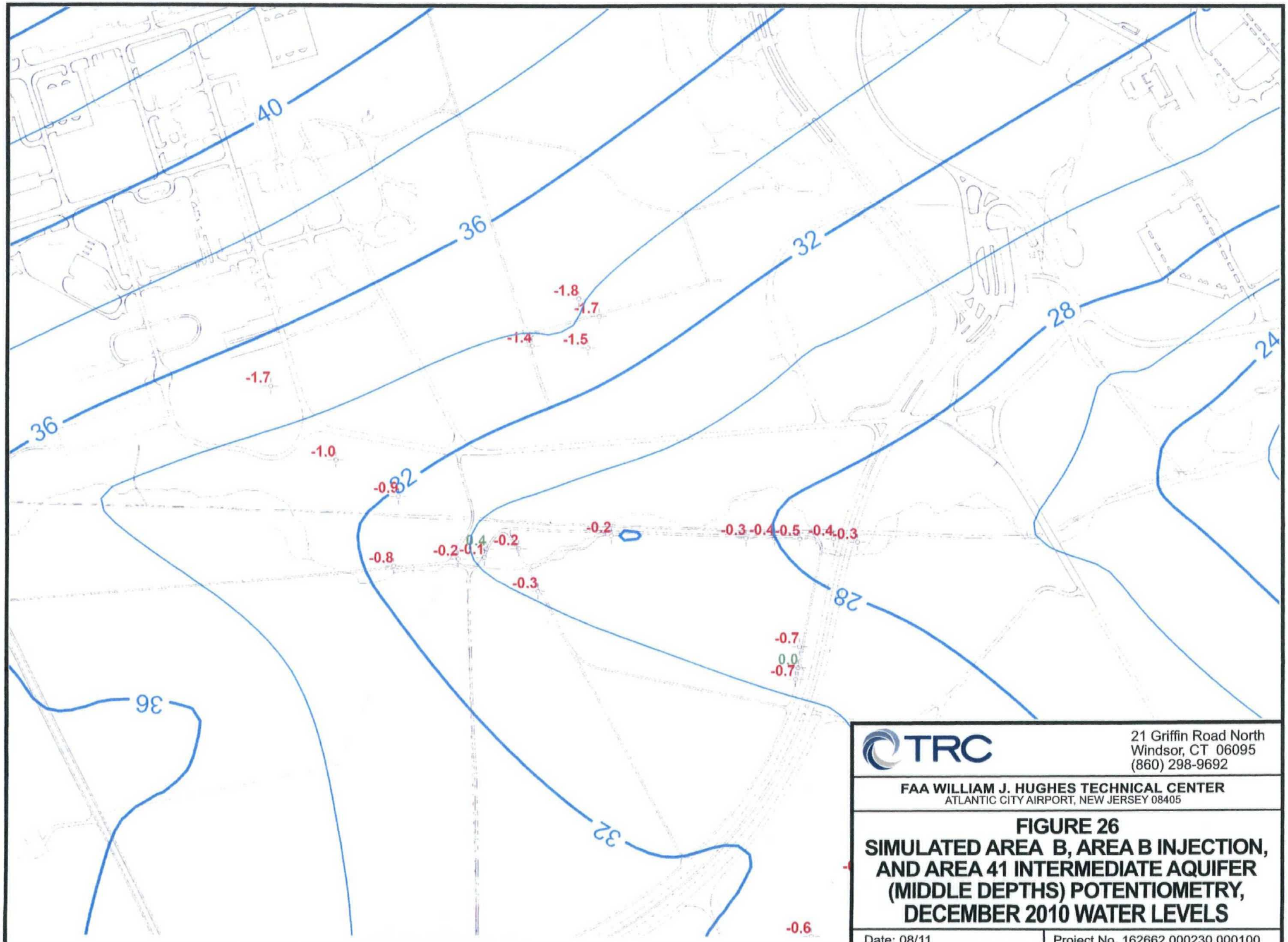

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FIGURE 26
SIMULATED AREA B, AREA B INJECTION, AND AREA 41 INTERMEDIATE AQUIFER (MIDDLE DEPTHS) POTENTIOMETRY, DECEMBER 2010 WATER LEVELS

Date: 08/11 | Project No. 162662.000230.000100

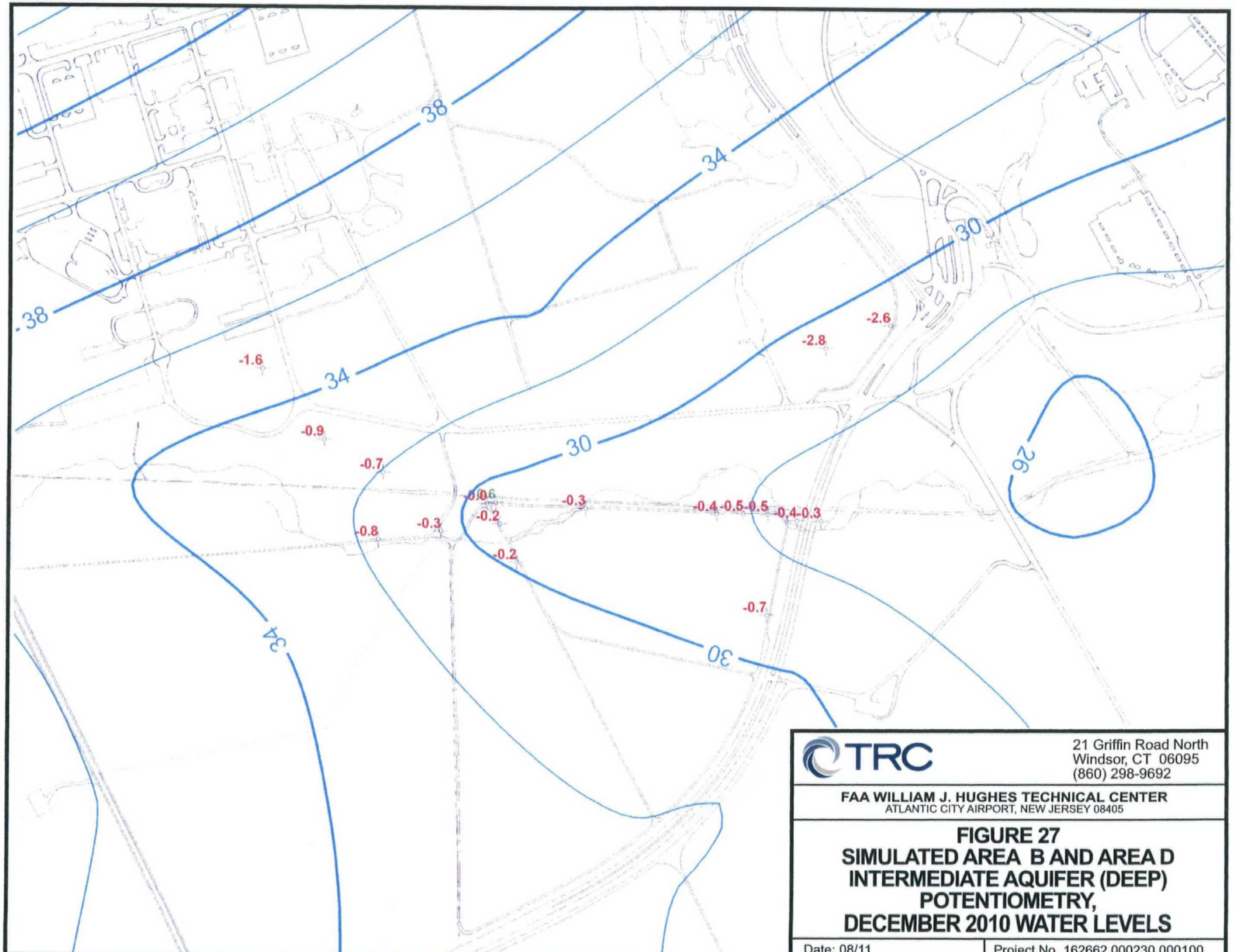

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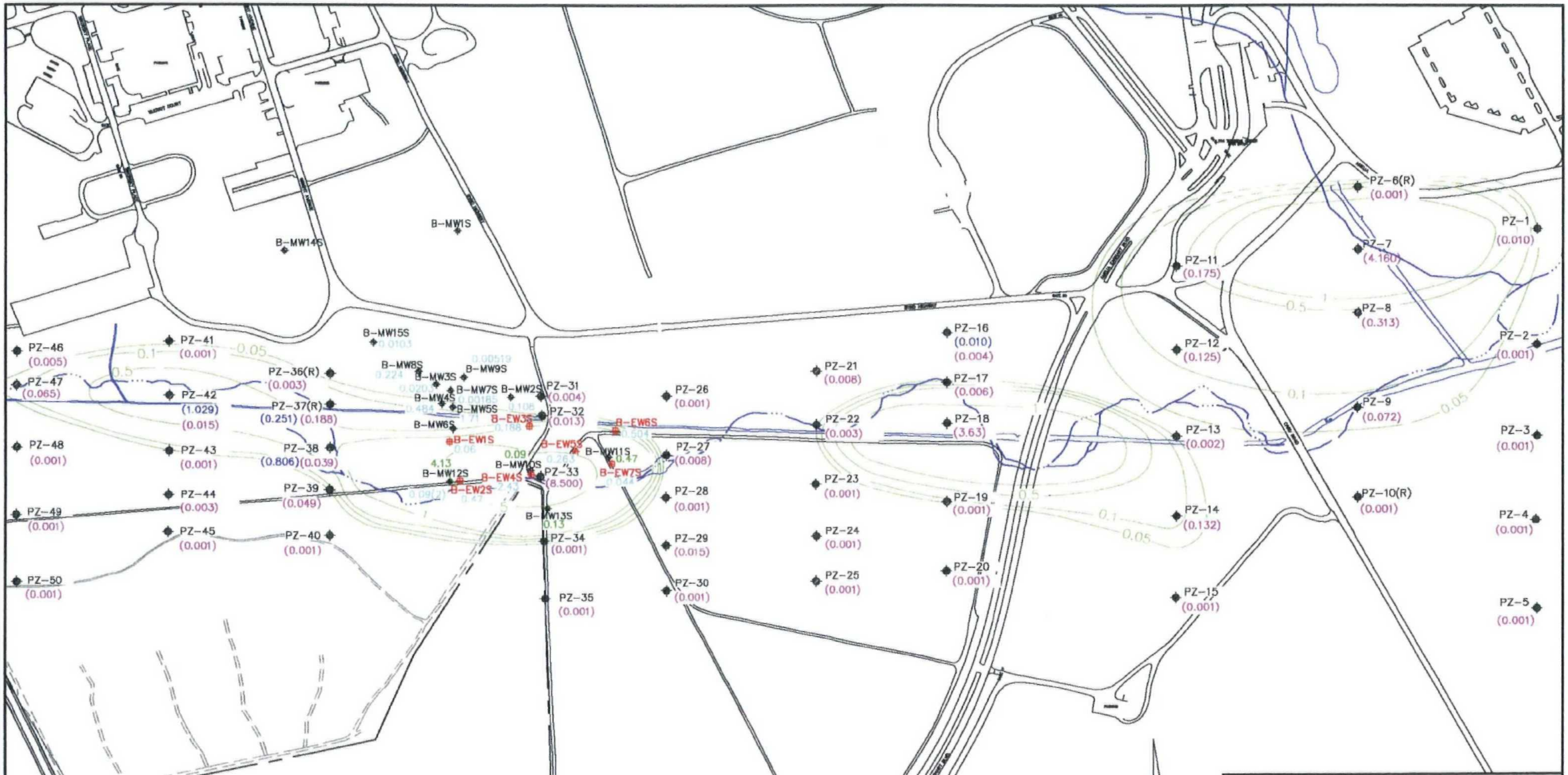
FIGURE 27
SIMULATED AREA B AND AREA D INTERMEDIATE AQUIFER (DEEP) POTENTIOMETRY, DECEMBER 2010 WATER LEVELS

Date: 08/11	Project No. 162662.000230.000100



LEGEND:

(0.001) MERCURY CONCENTRATIONS PRESENTED IN μg/L (PARTS PER BILLION) – DECEMBER 2010

(1.029) MERCURY CONCENTRATIONS PRESENTED IN μg/L (PARTS PER BILLION) – 2001–2004

0.0103 MERCURY CONCENTRATIONS PRESENTED IN μg/L (PARTS PER BILLION) – JULY 2010

0.09 MERCURY CONCENTRATIONS PRESENTED IN μg/L (PARTS PER BILLION) – AVERAGE OF AUGUST, SEPT., AND NOV. 2010

NOTES:
1) HORIZONTAL DATUM: NJ STATE PLANE, NAD 1983.

0 350' 700'
GRAPHIC SCALE

NJ State Grid 1983

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FIGURE 28
AREA U PIEZOMETER MERCURY ISOPLETH CONTOURS WITH "SOURCE CONCENTRATION" POINT DATA RESULTS

Date: 02/09/11	Project No. 162662-000220-000104

R:\Kat\FAA Area B\
ACAD 2007-Mercury-DAVE.dwg Layout:Shallow April 08, 2011-11:22AM kstraskraba

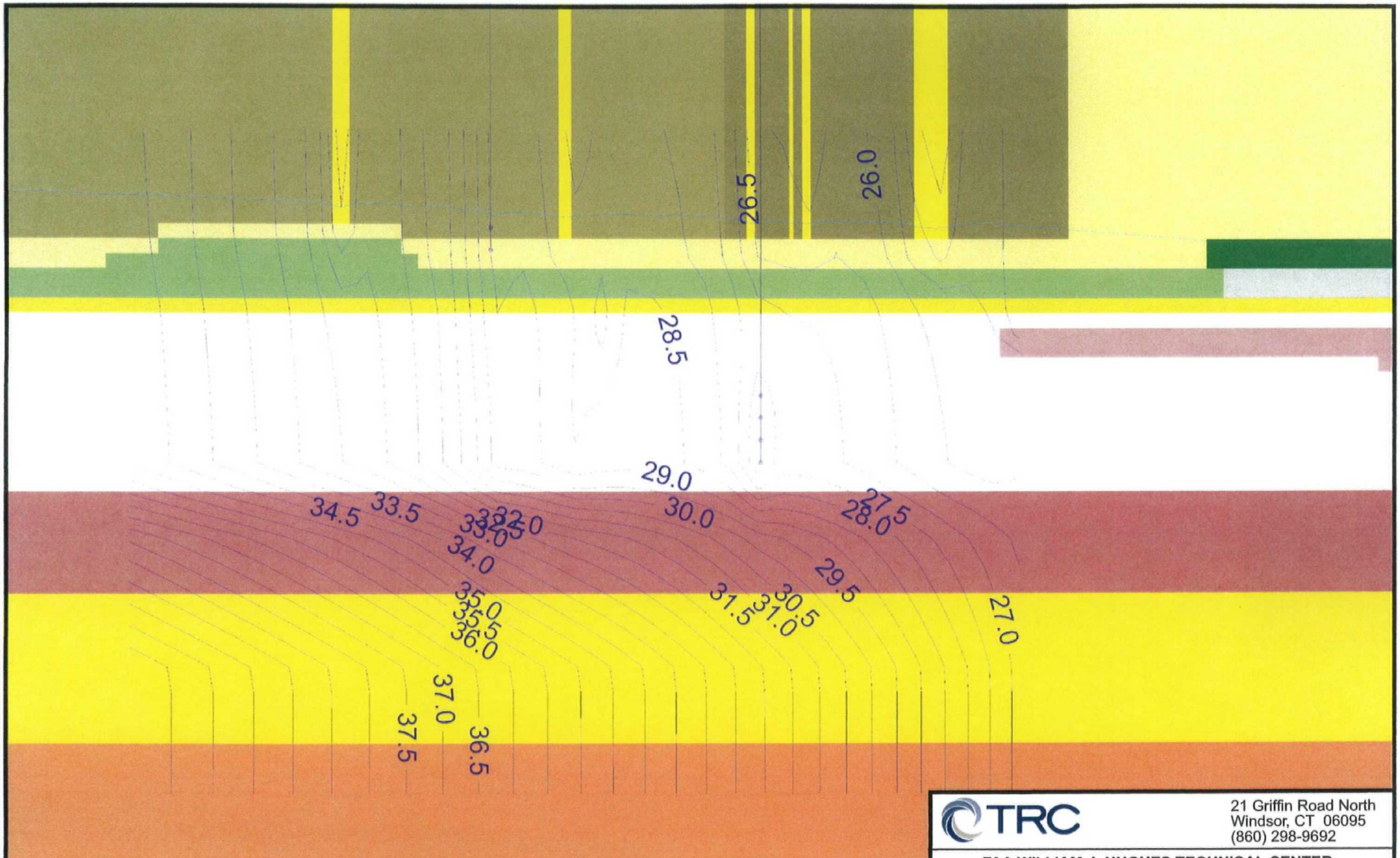

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FIGURE 29
W-E HYDRAULIC PROFILE ALONG SBAC (WITH STRATIGRAPHY), DECEMBER 2010, B-EW5S AND B-EW4D

Date: 08/11	Project No. 162662.000230.000100

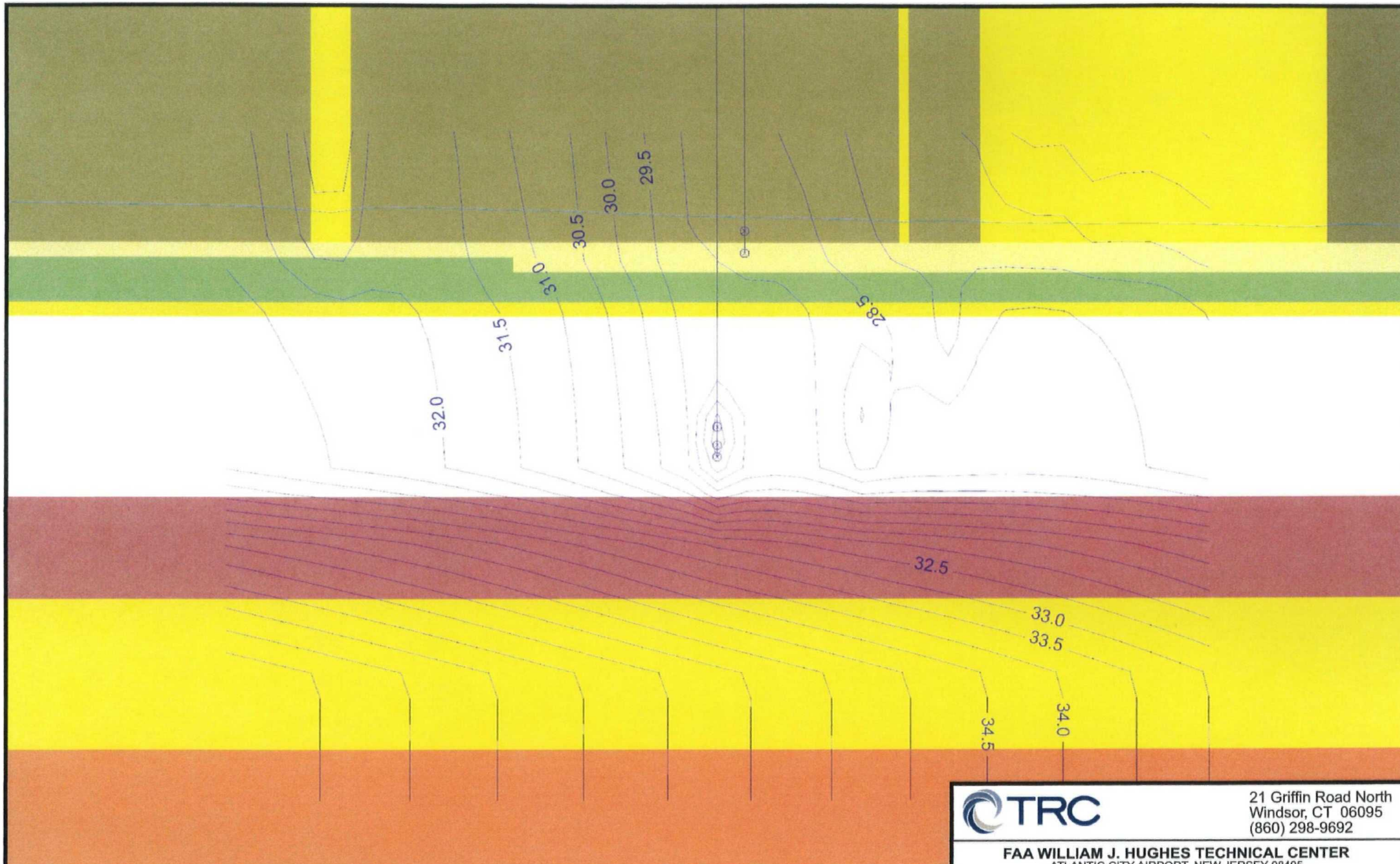

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FIGURE 30
W-E HYDRAULIC PROFILE ALONG SBAC (WITH STRATIGRAPHY), DECEMBER 2010, B-EW6S AND B-EW1D

Date: 08/11 | Project No. 162662.000230.000100

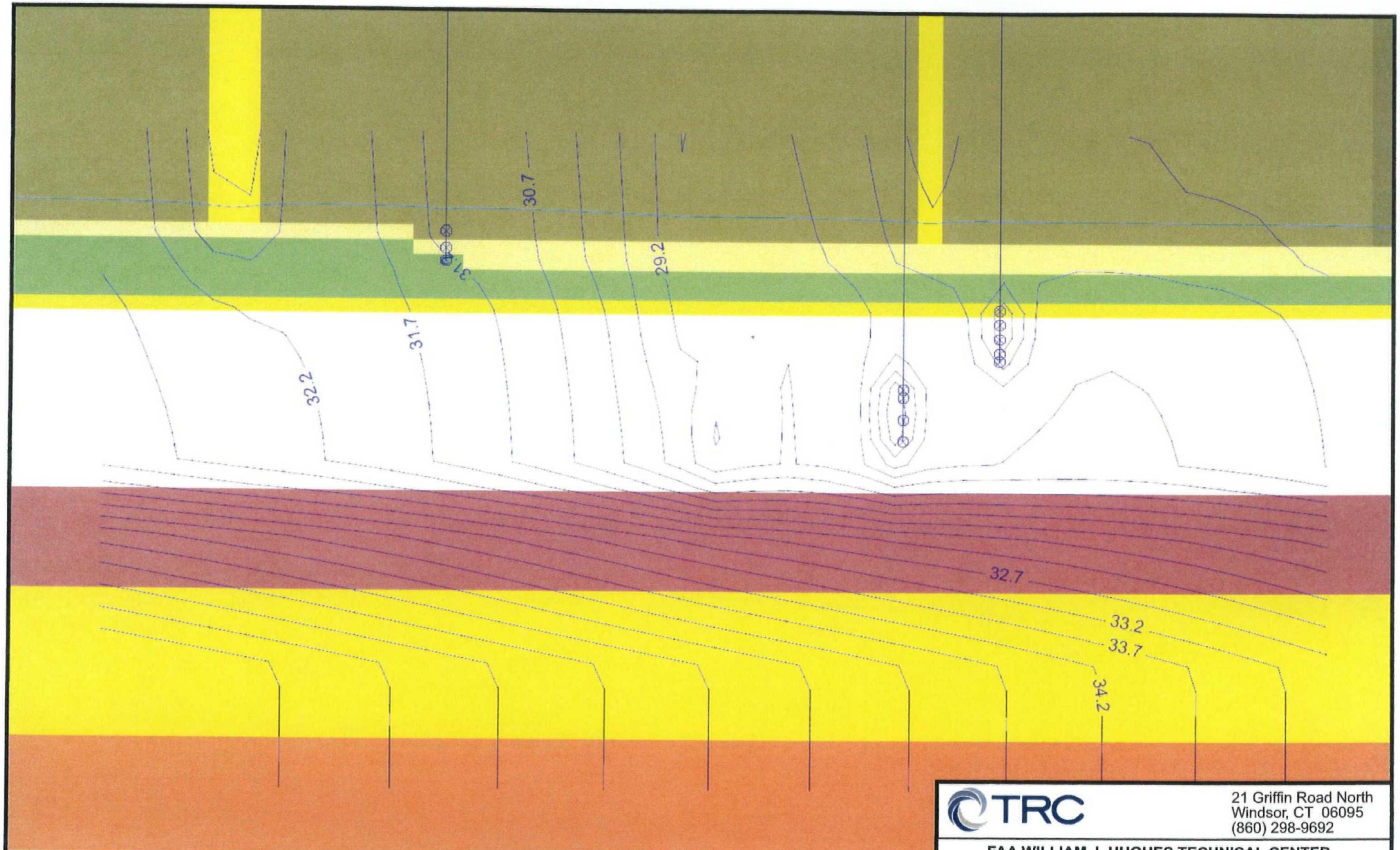

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FIGURE 31
W-E HYDRAULIC PROFILE ALONG SBAC (WITH STRATIGRAPHY), DECEMBER 2010, B-EW1S, B-EW2M, AND B-EW2D

Date: 08/11	Project No. 162662.000230.000100

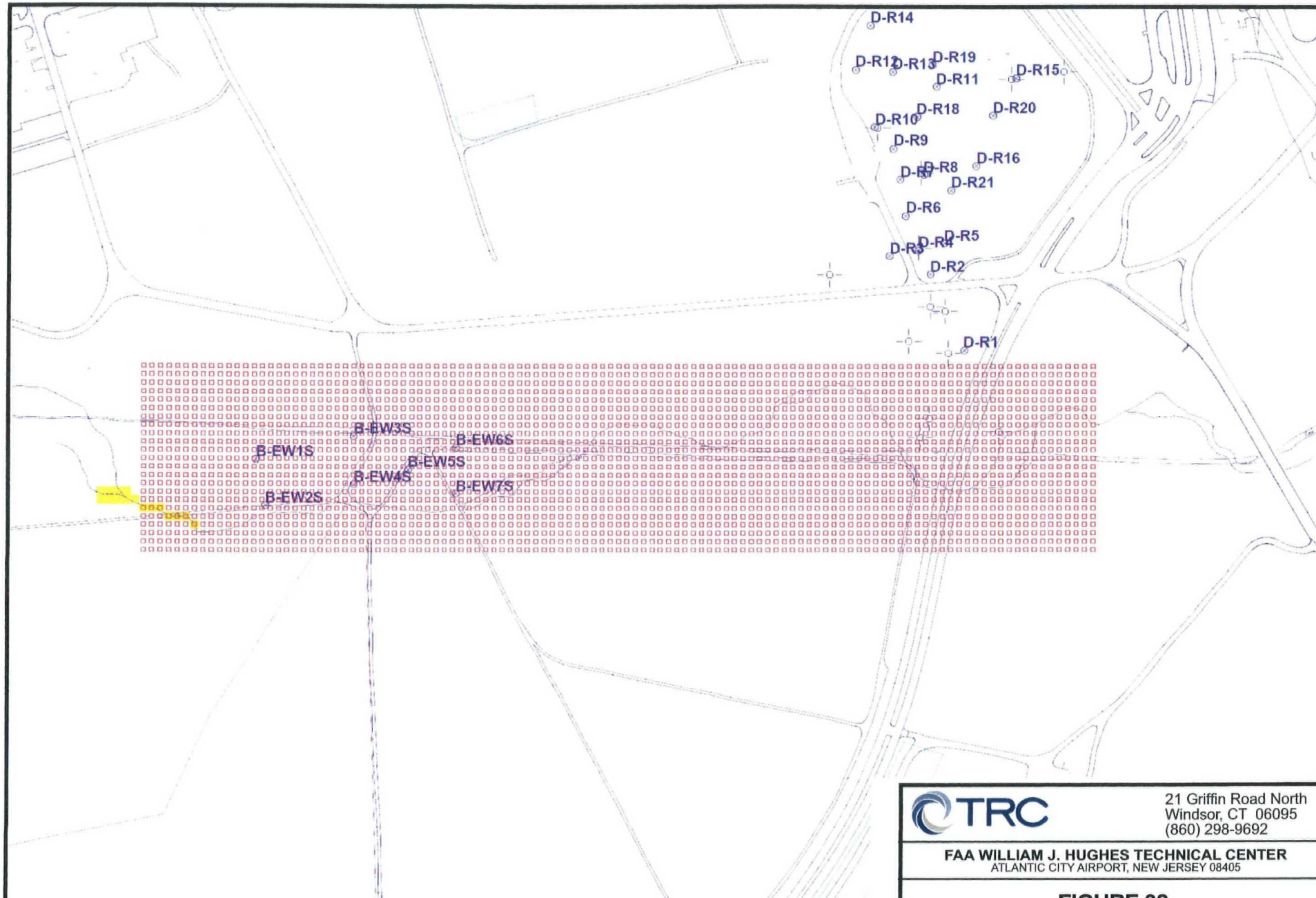

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FIGURE 32
PARTICLE STARTING LOCATIONS, SHALLOW AQUIFER/LAYER 2

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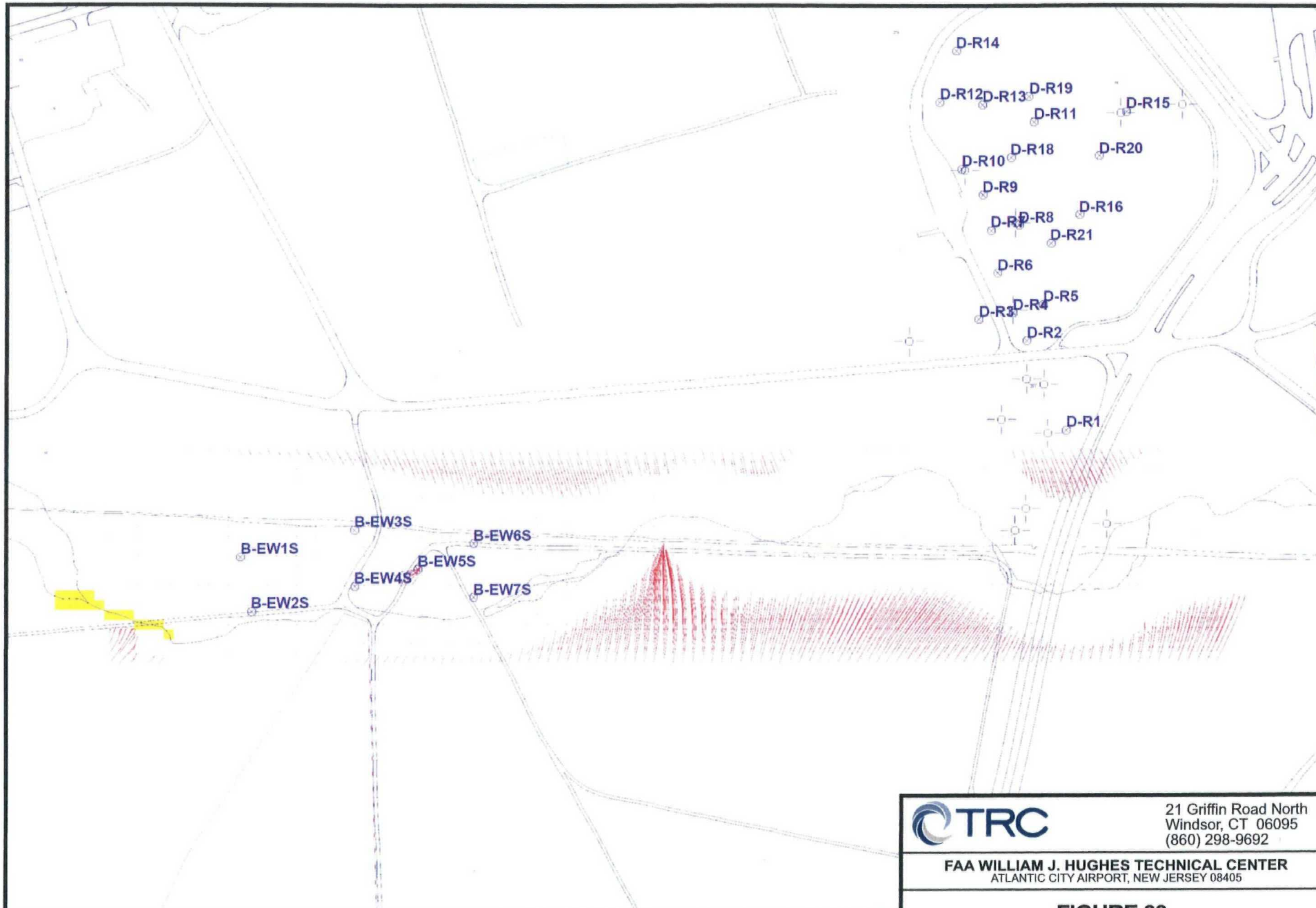

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FIGURE 33
PARTICLE TRACKS, SHALLOW AQUIFER/LAYER 2

Date: 08/11	Project No. 162662.000230.000100

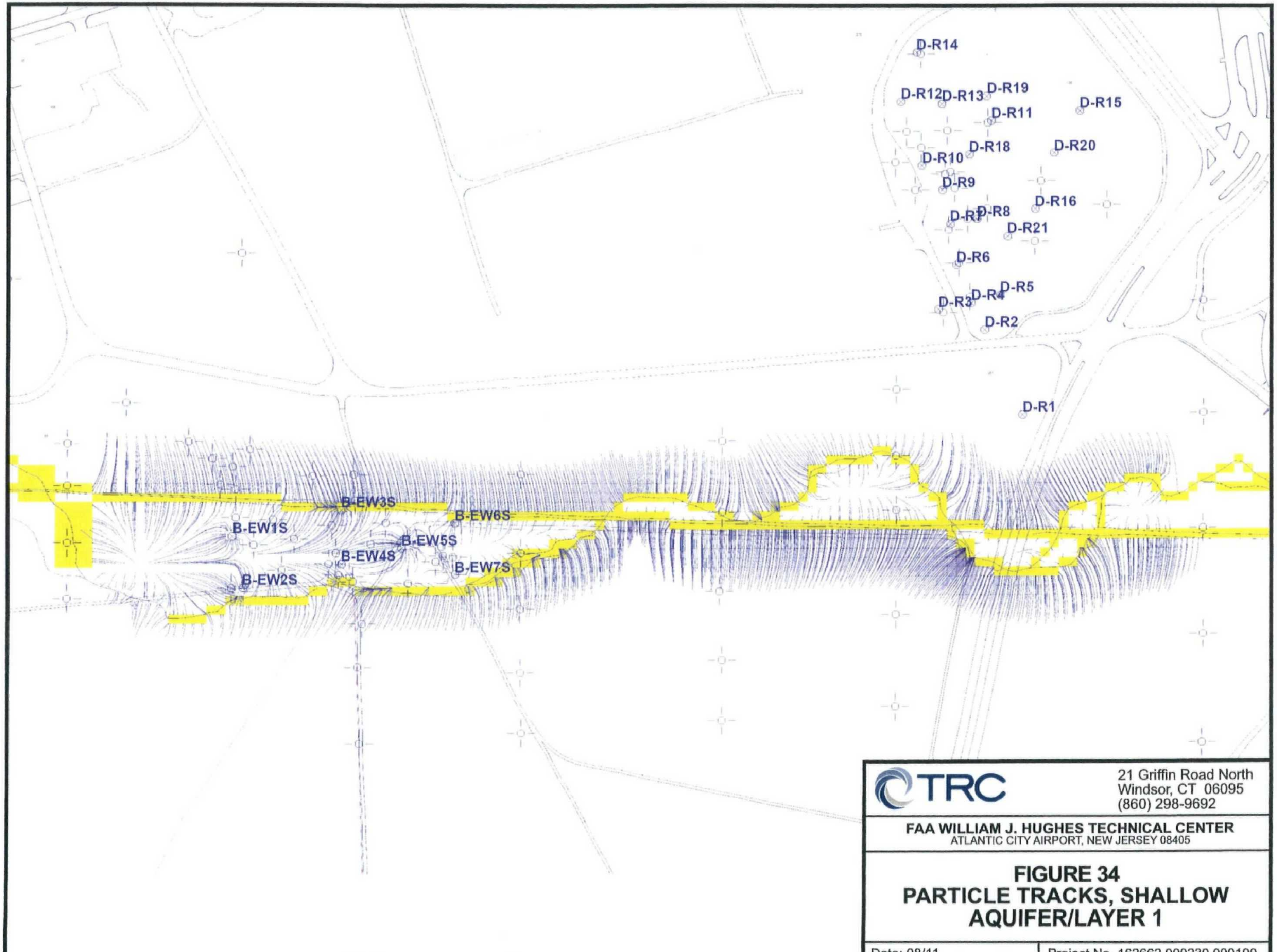

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FIGURE 34
PARTICLE TRACKS, SHALLOW AQUIFER/LAYER 1

Date: 08/11 | Project No. 162662.000230.000100

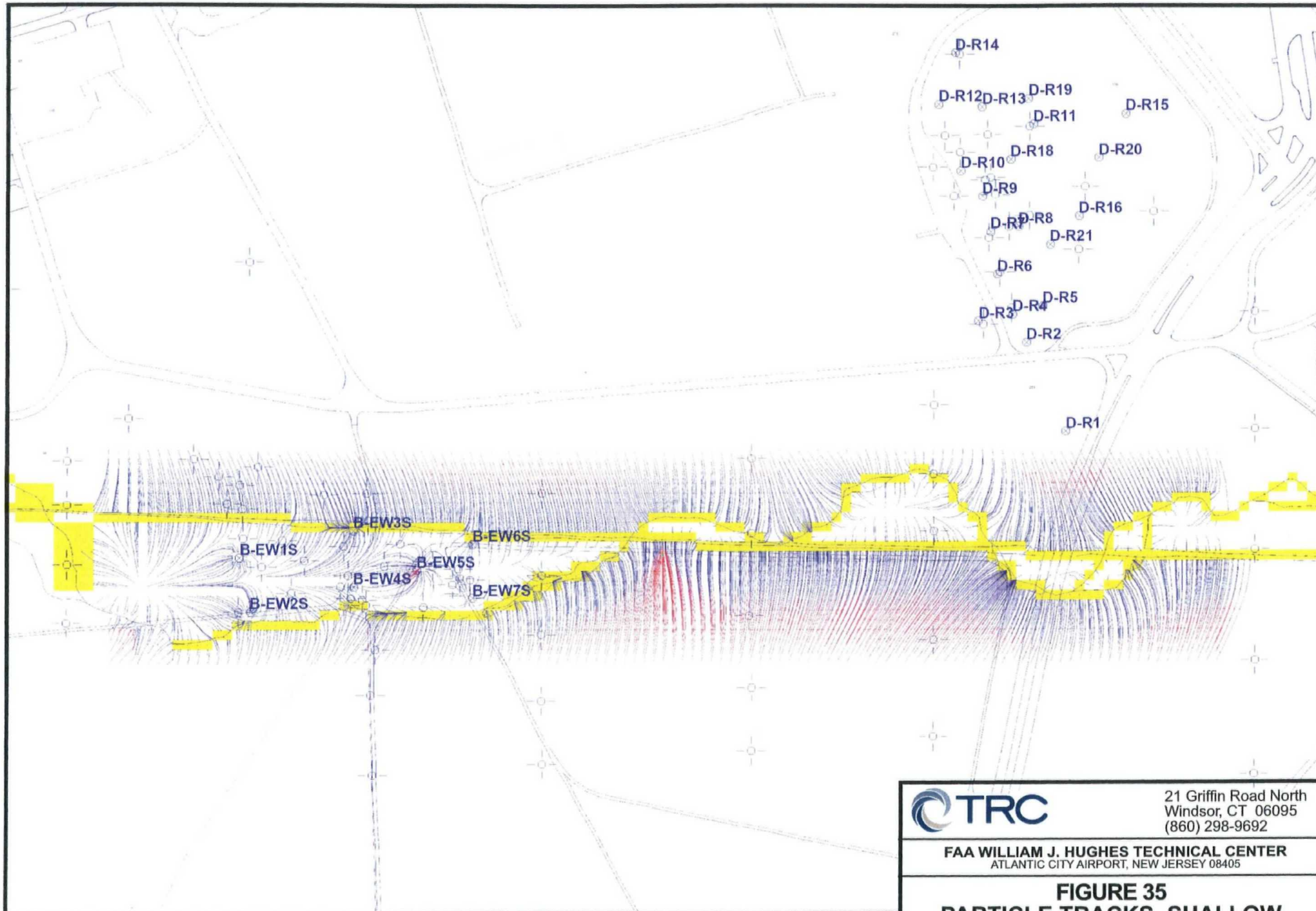

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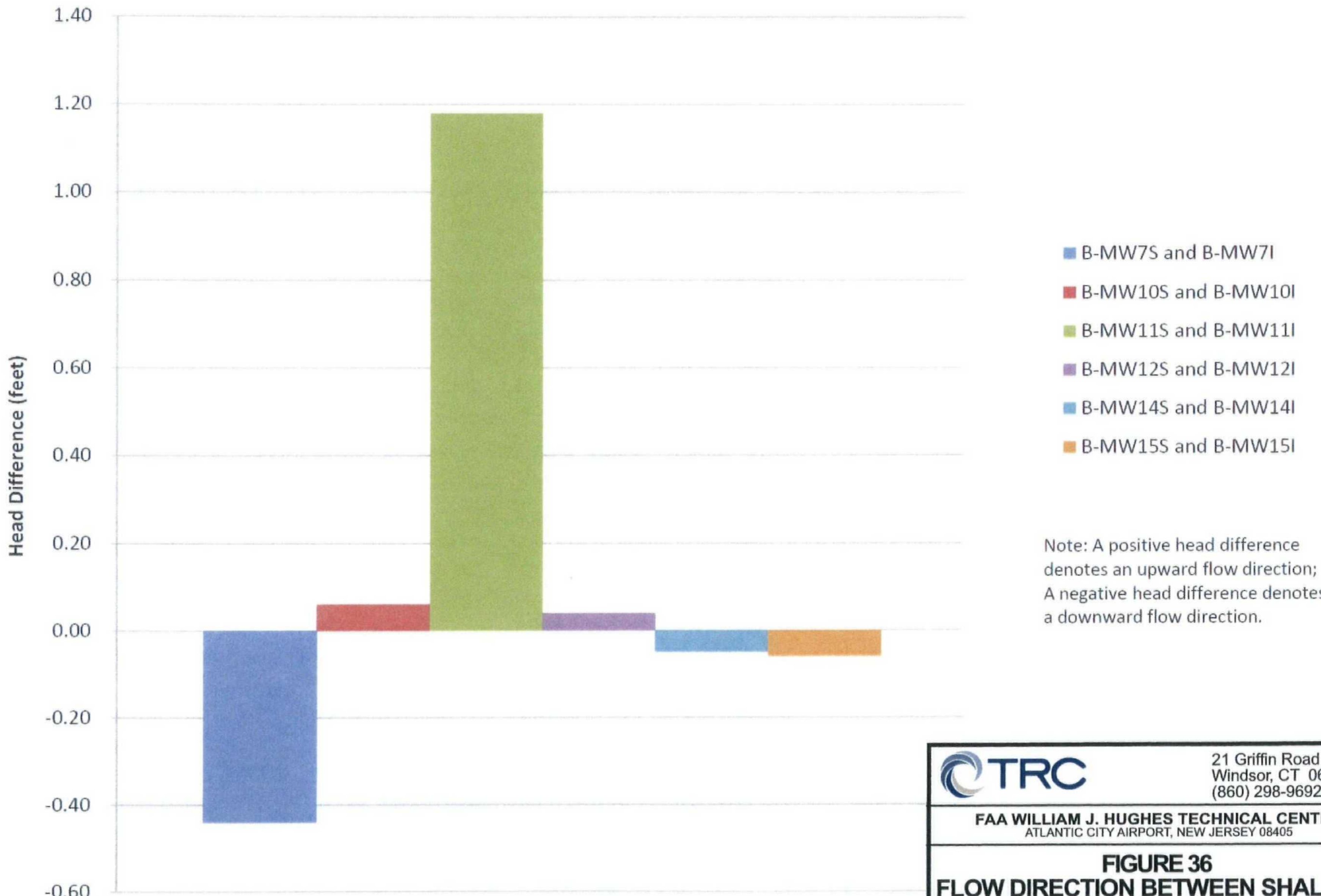
FIGURE 35
PARTICLE TRACKS, SHALLOW AQUIFER/LAYER 1, LAYER 2 = RED, LAYER 1 = BLUE

Date: 08/11 | Project No. 162662.000230.000100



Note: A positive head difference denotes an upward flow direction; A negative head difference denotes a downward flow direction.

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FIGURE 36
FLOW DIRECTION BETWEEN SHALLOW AND MIDDLE SCREENED AREA B MONITORING WELLS – MAY 2008

Date: 08/11	Project No. 162662.000230.000100

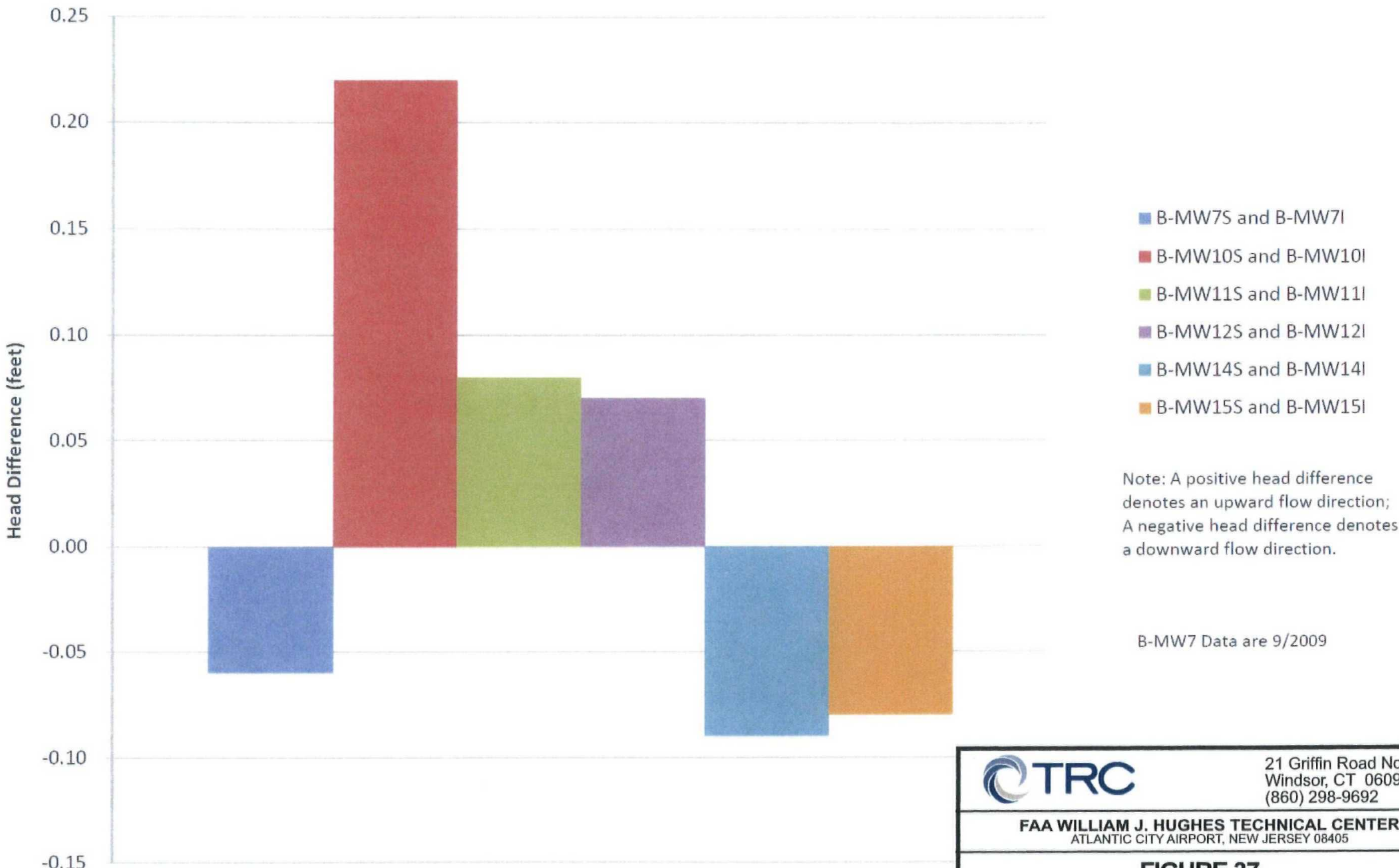

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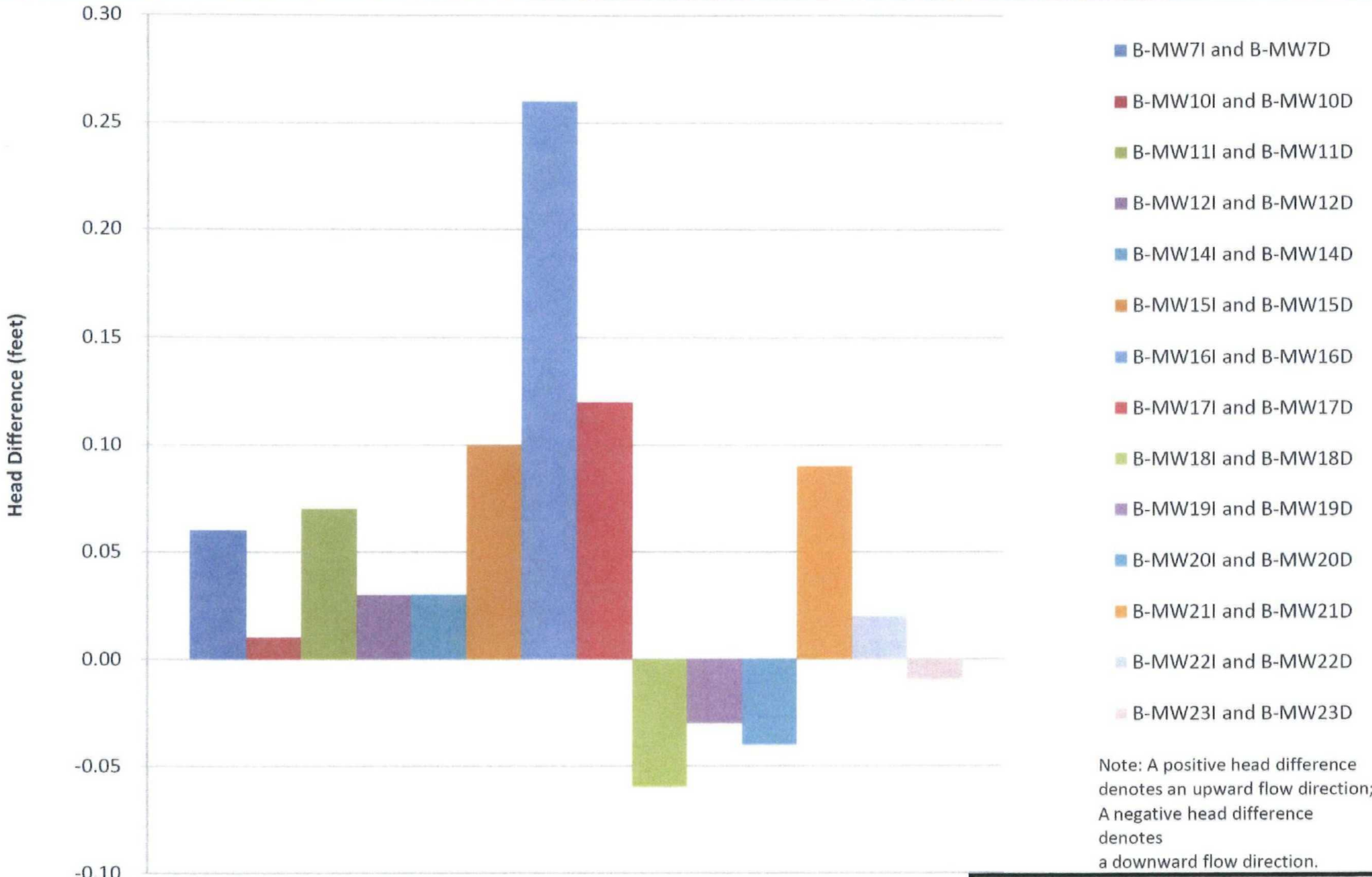
FIGURE 37
FLOW DIRECTION BETWEEN SHALLOW AND MIDDLE SCREENED AREA B MONITORING WELLS – JUNE 2009

Date: 08/11	Project No. 162662.000230.000100



Note: A positive head difference denotes an upward flow direction; A negative head difference denotes a downward flow direction.

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FIGURE 38
FLOW DIRECTION BETWEEN MIDDLE AND DEEP SCREENED AREA B MONITORING WELLS – MAY 2008

Date: 08/11 | Project No. 162662.000230.000100

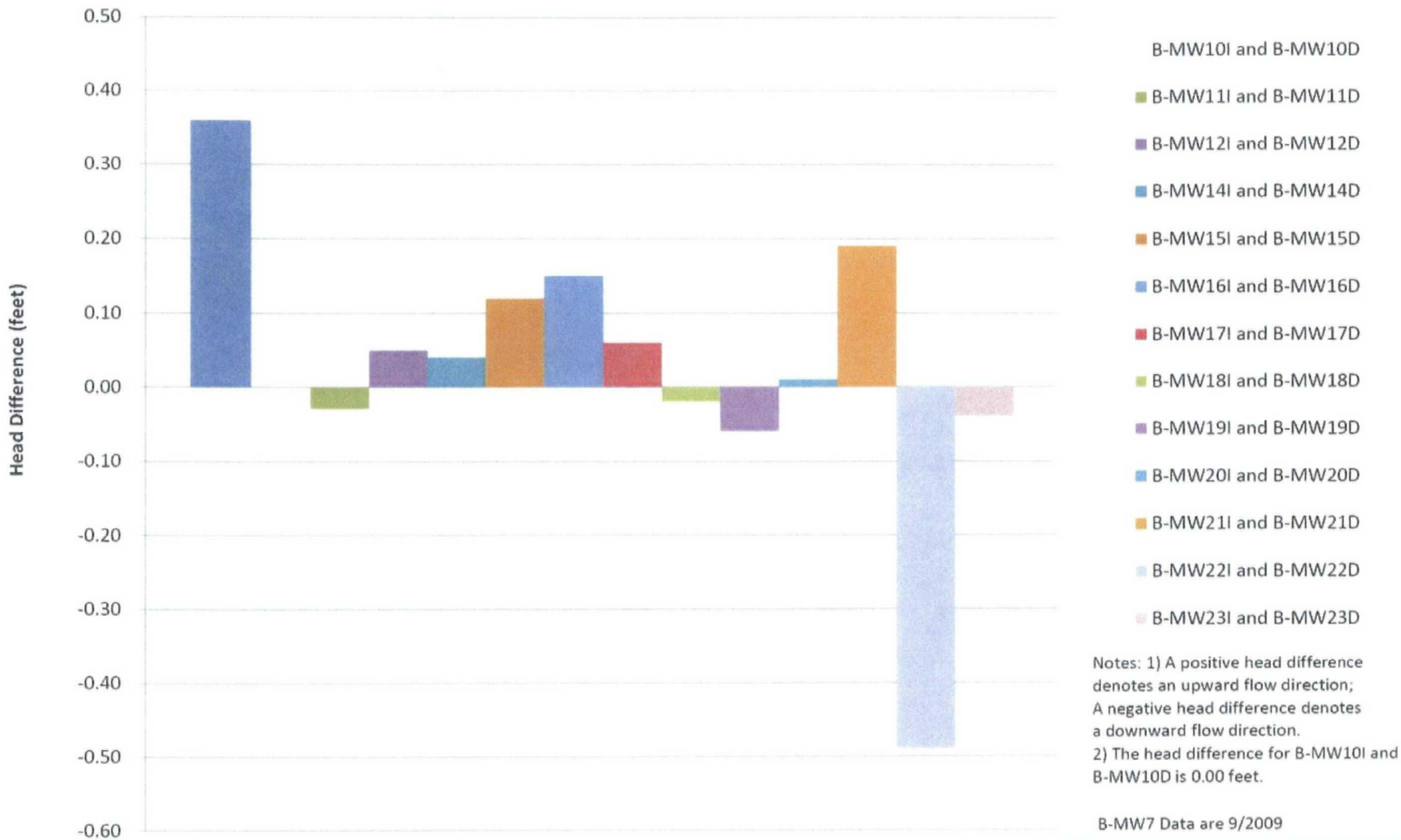

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FIGURE 39
FLOW DIRECTION BETWEEN MIDDLE AND DEEP SCREENED AREA B MONITORING WELLS – JUNE 2009

Date: 08/11 | Project No. 162662.000230.000100

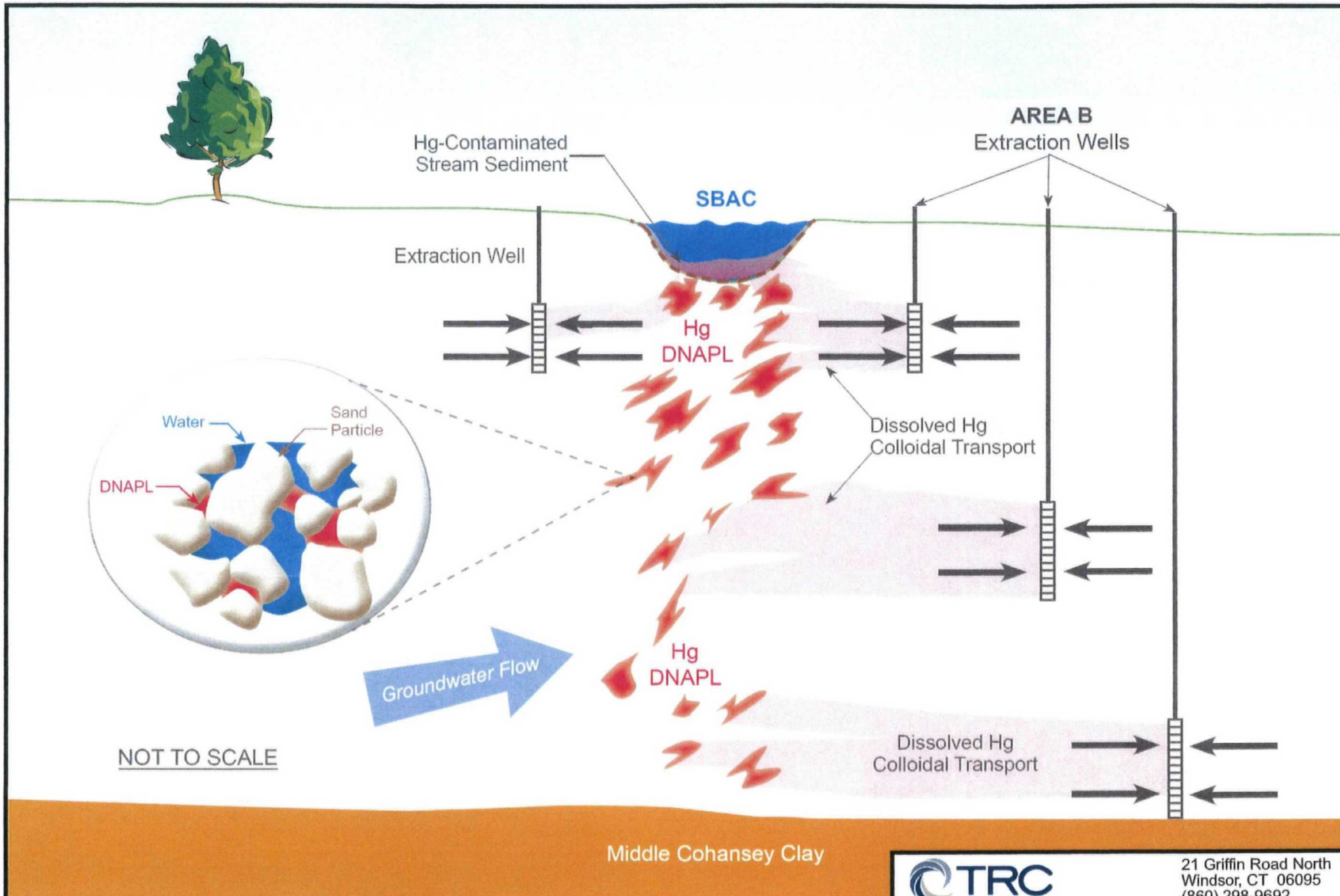

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FIGURE 40

REVISED CONCEPTUAL MODEL OF HG DISTRIBUTION AND TRANSPORT

Date: 08/11	Project No. 162662.000230.000100

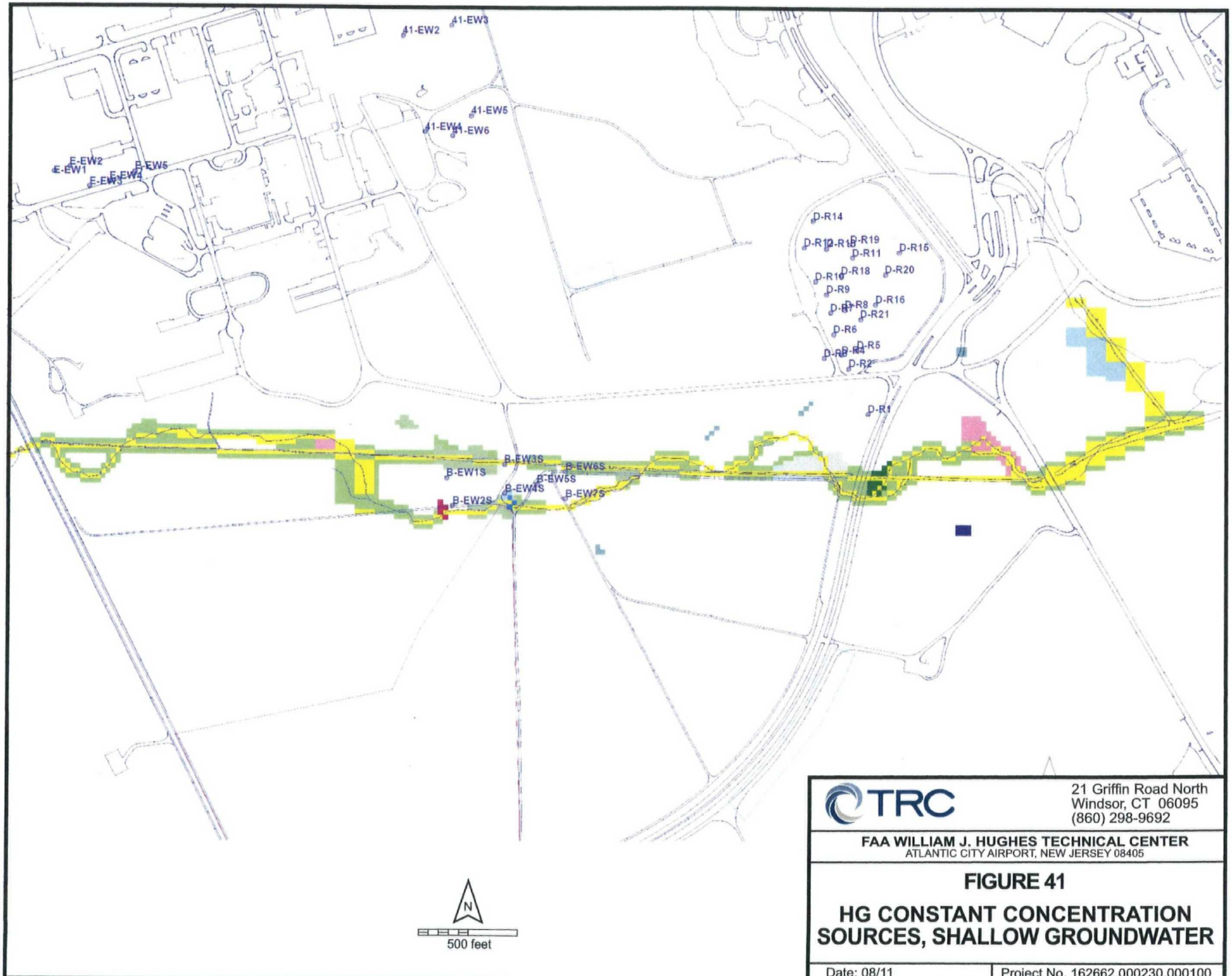

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FIGURE 41

HG CONSTANT CONCENTRATION SOURCES, SHALLOW GROUNDWATER

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FIGURE 42

HG CONSTANT CONCENTRATION SOURCES, DEEP GROUNDWATER

Date: 08/11 | Project No. 162662.000230.000100

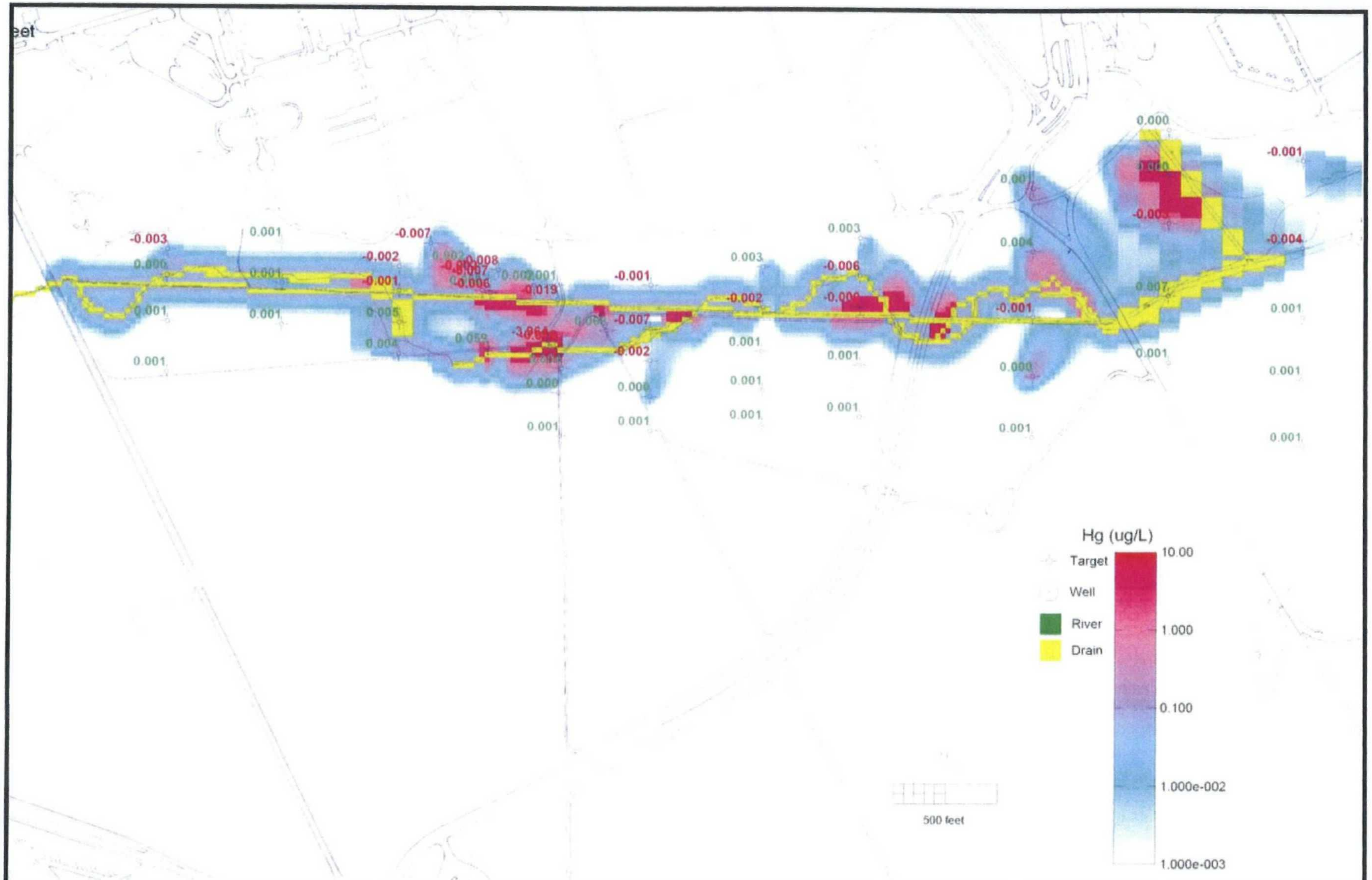

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FIGURE 43

SHALLOW HG PLUME AND CALIBRATION ERRORS

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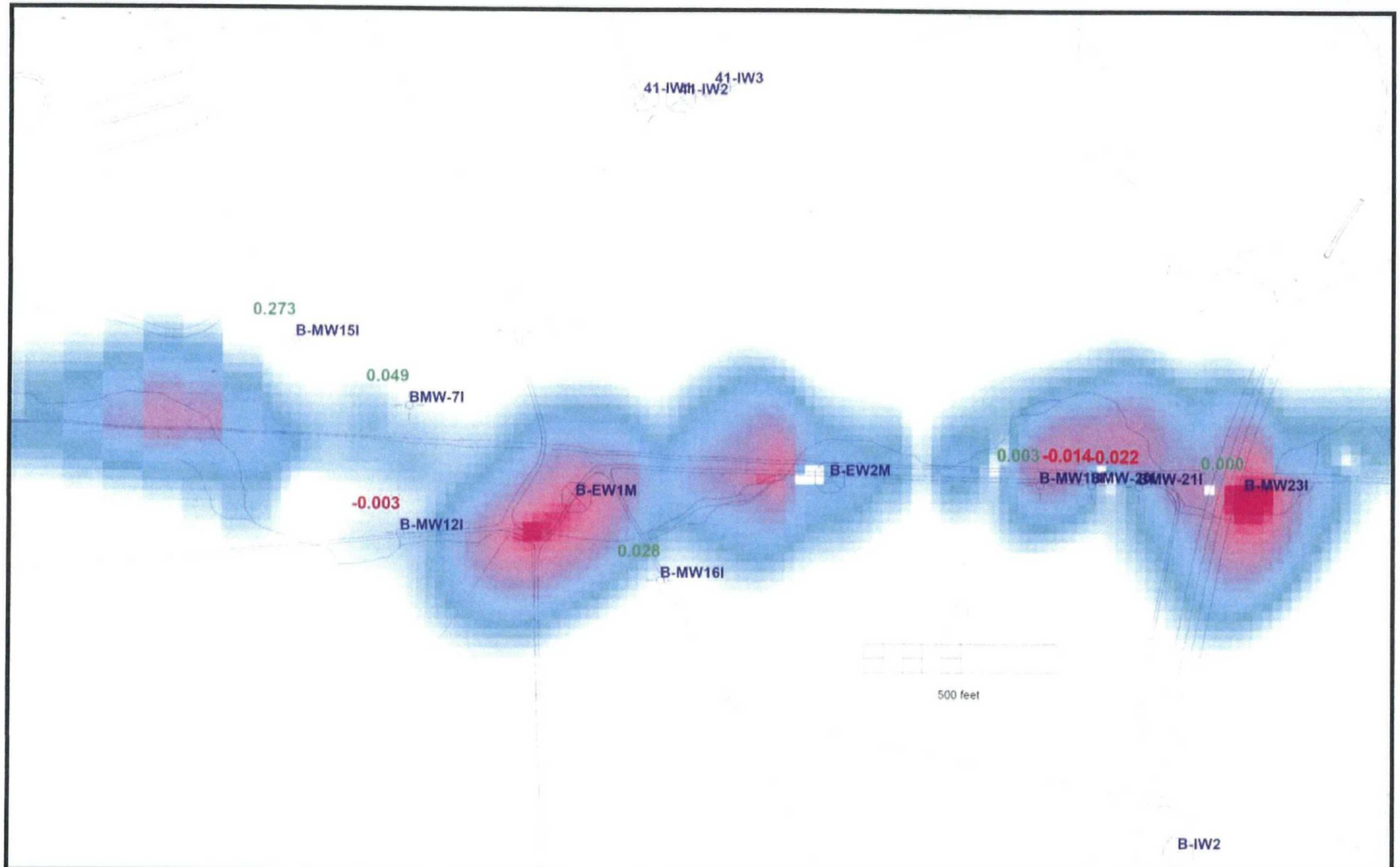

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FIGURE 44

MIDDLE DEPTH HG PLUME AND CALIBRATION ERRORS

Date: 08/11	Project No. 162662.000230.000100

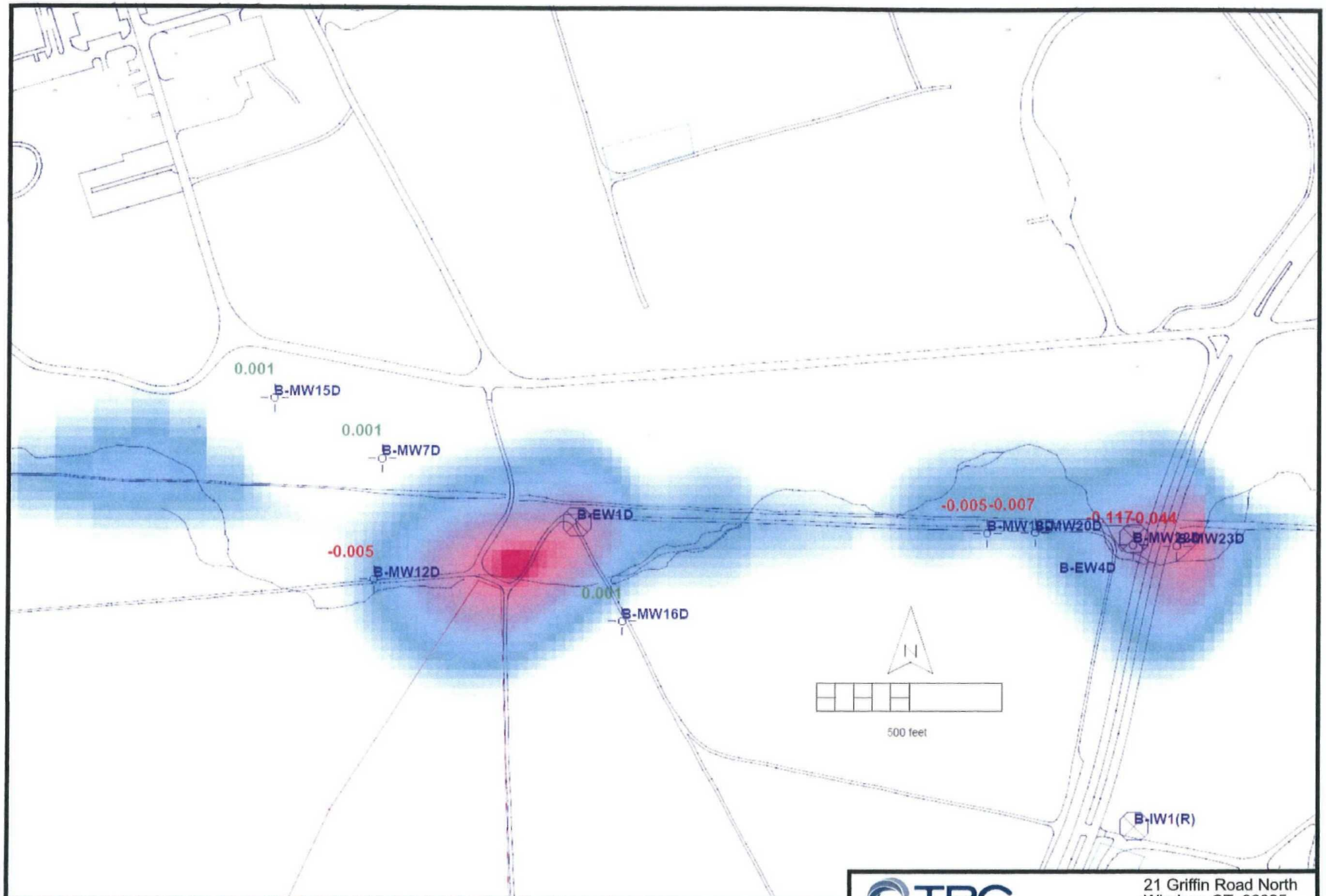

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FIGURE 45

DEEP HG PLUME AND CALIBRATION ERRORS

Date: 08/11	Project No. 162662.000230.000100

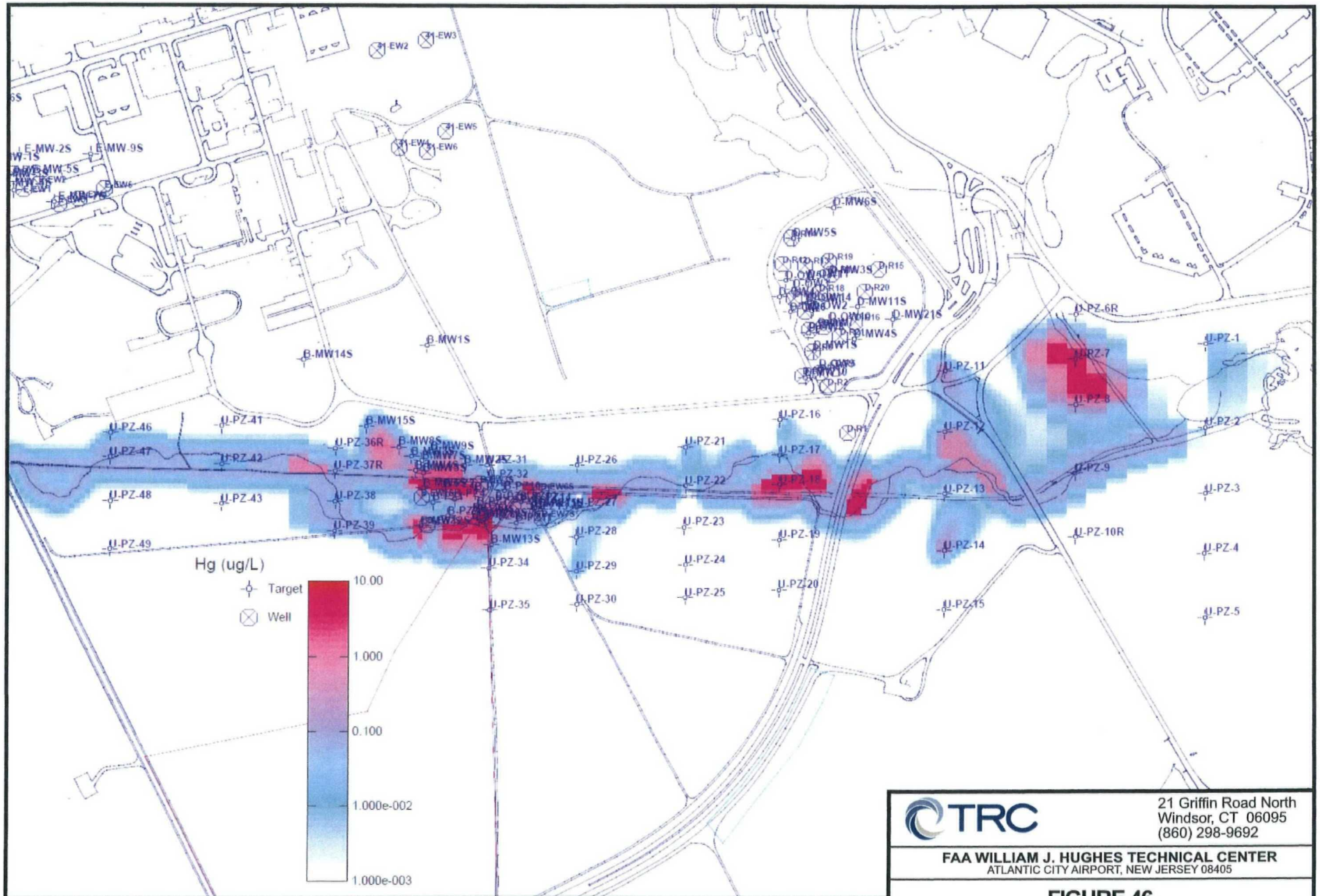

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FIGURE 46

SHALLOW HG PLUME 2041, CONTINUOUS AREA B EXTRACTION

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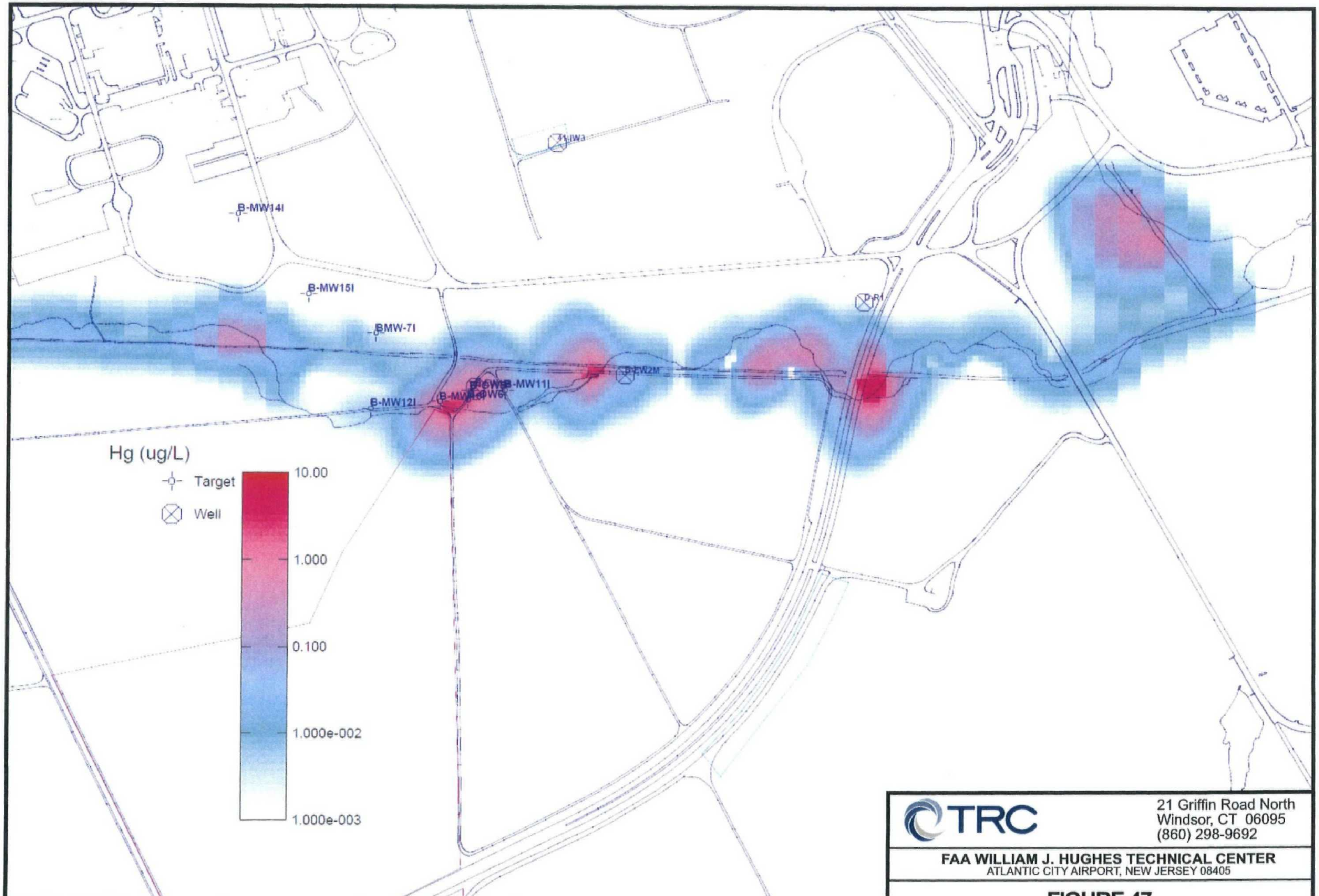

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FIGURE 47

MIDDLE DEPTH HG PLUME 2041, CONTINUOUS AREA B EXTRACTION

Date: 08/11 | Project No. 162662.000230.000100

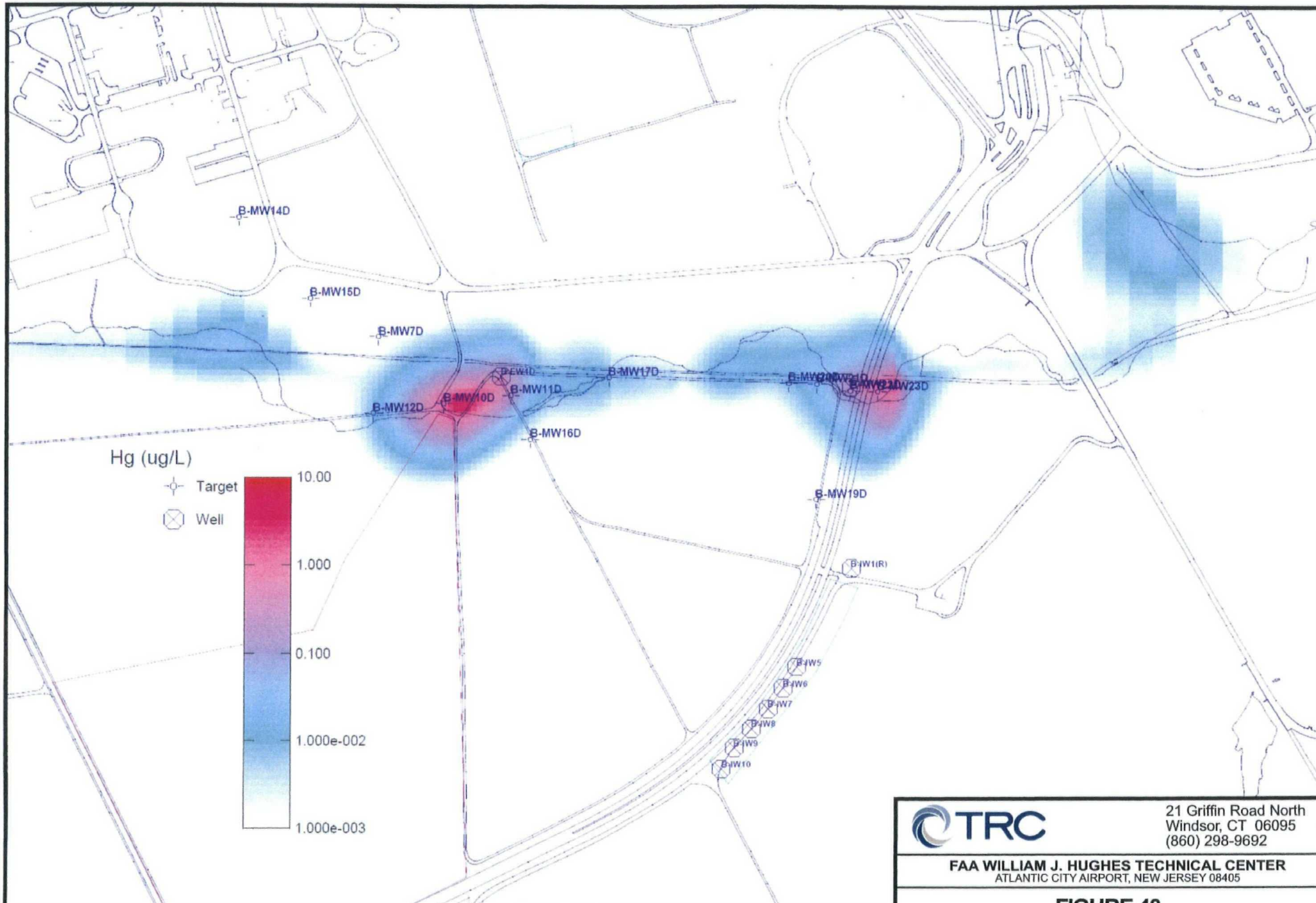

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FIGURE 48

DEEP HG PLUME 2041, CONTINUOUS AREA B EXTRACTION

Date: 08/11 | Project No. 162662.000230.000100

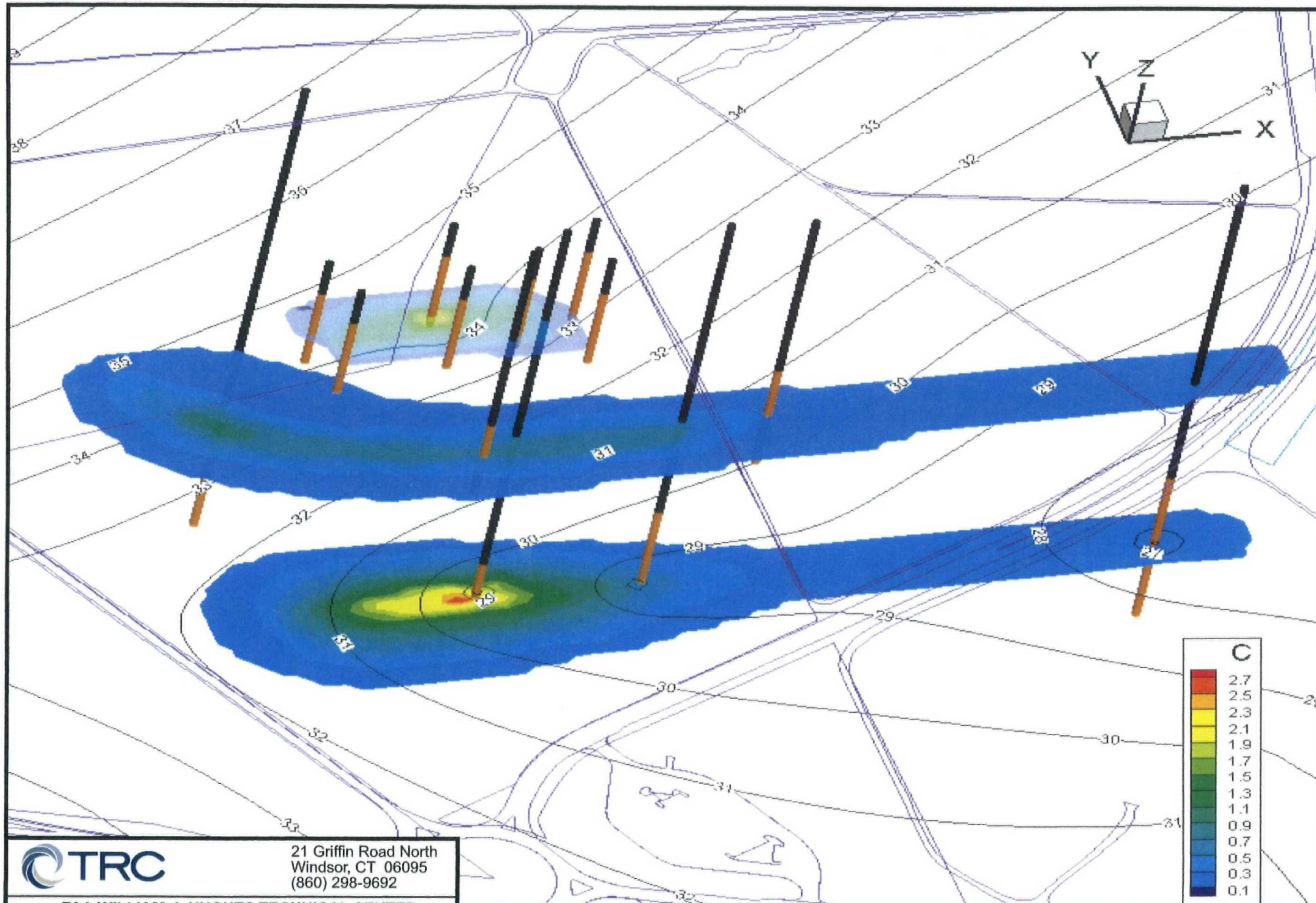

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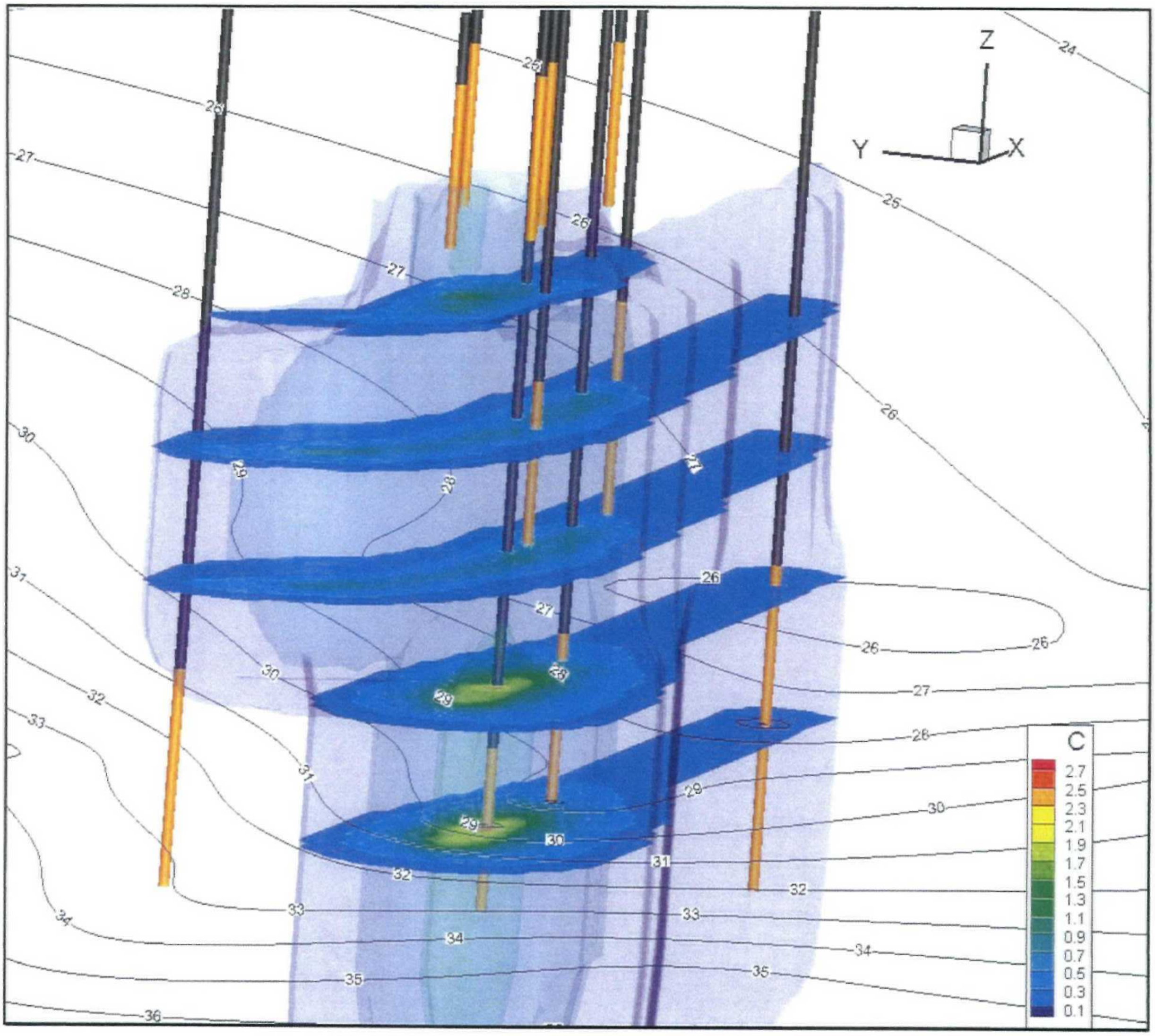
FIGURE 49

INITIAL TCE CONCENTRATIONS

Date: 08/11 | Project No. 162662.000230.000100

Concentrations in ug/L



Concentrations in ug/L

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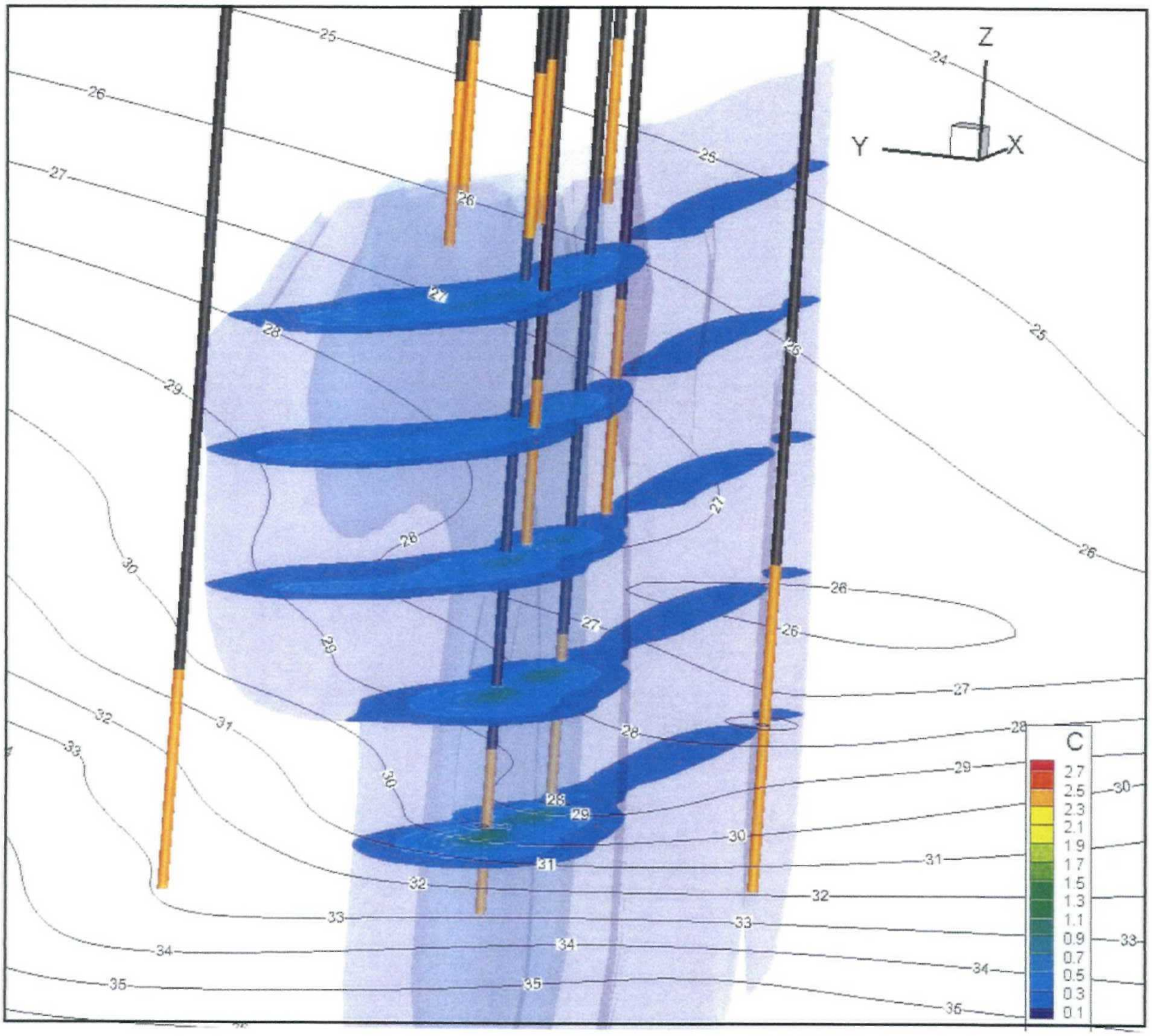
FIGURE 50

INITIAL TCE CONCENTRATIONS – VERTICAL INTERPOLATION

Date: 08/11	Project No. 162662.000230.000100



Concentrations in ug/L

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FIGURE 51

SIMULATED TCE PLUME 2020

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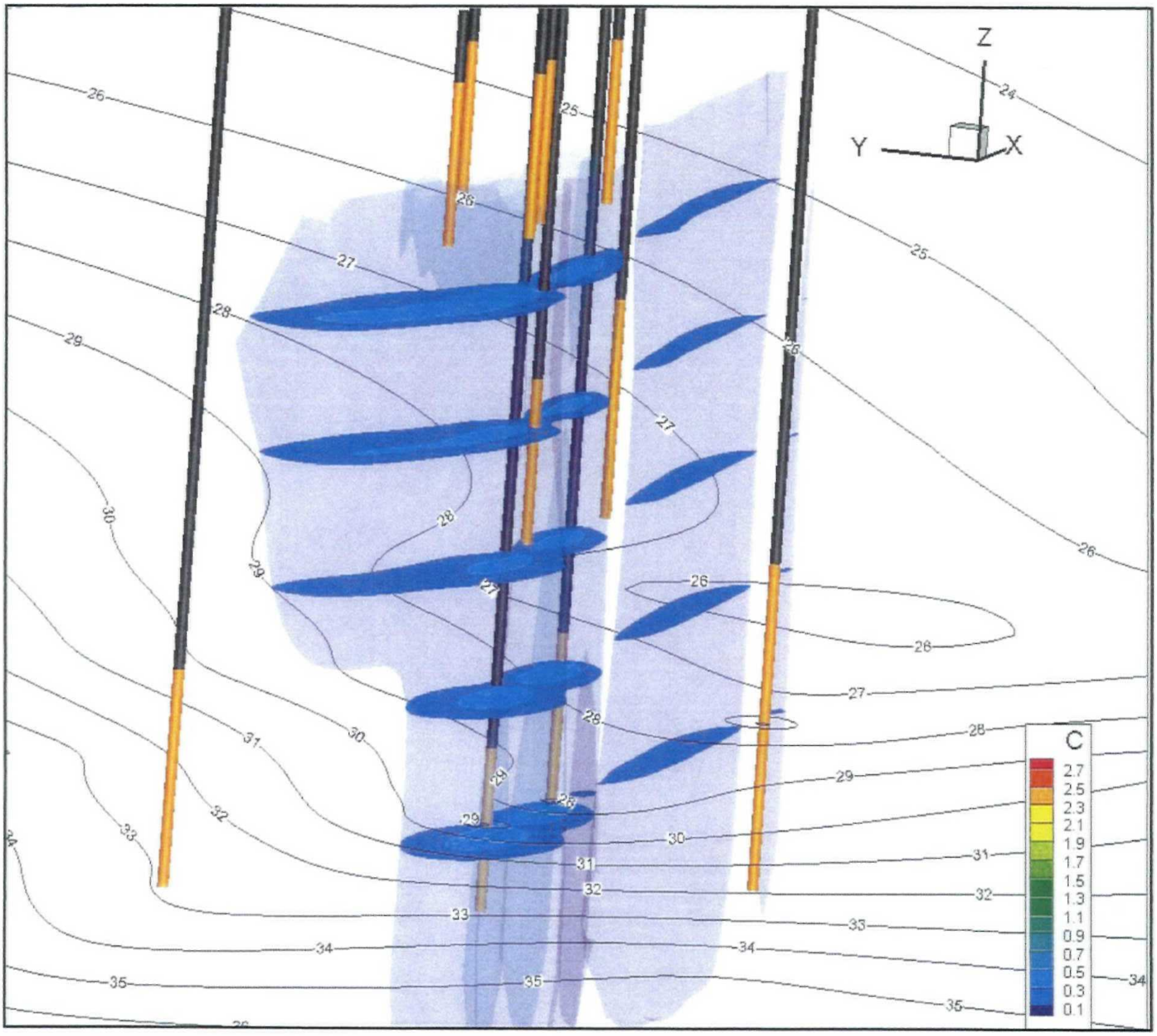

Concentrations in ug/L

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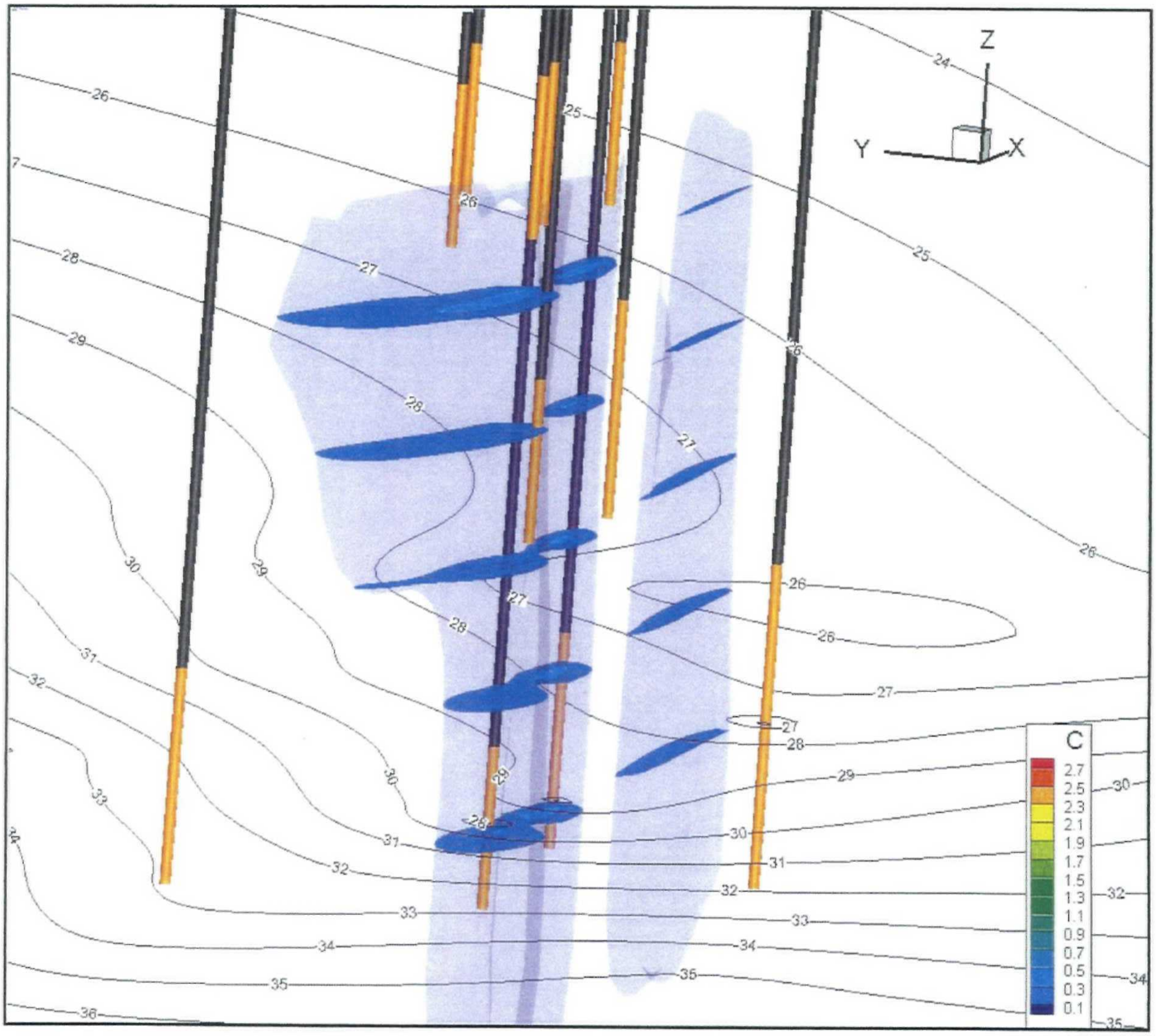
FIGURE 52

SIMULATED TCE PLUME 2030

Date: 08/11	Project No. 162662.000230.000100



Concentrations in ug/L

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FIGURE 53

SIMULATED TCE PLUME 2040

Date: 08/11	Project No. 162662.000230.000100

APPENDIX A

55-YEAR SIMULATION – DATA FOR HYDRAULIC STRESSES

Historical Hg Transport Setup

Assumed 1955 Hg Release/Sediment Deposition

Atlantic City reservoirs built in 1930s

ACMUA started 1985 (simulated rates based on 2008 annualized rates – 2008 was before more reservoir used considered, as discussed at 2009 meeting)

Stress Periods (stresses continue, unless indicated otherwise)

1. 30 years no ACMUA or remediation wells, Atlantic City reservoirs simulated; 1955 - 1985
2. 7 years with ACMUA, no remediation pumping, 1985 – 1992
3. Jan 1992 – July 1992 20A deep extraction (EW-1, -2, -3) and 20A recharge basin startup
4. July 1992 – March 1993 Change in deep 20A rates
5. March 1993 – Feb 1995 Change in deep 20A rates (cycling = 50% effective rate)
6. Feb 1995 – 1996 Area D startup
7. 1996 – 1998 Total 20A system flow change, 20A injection and shallow wells startup
8. 1998 – 2004 Total 20A system flow change
9. Jan 2004 – Oct 2004 Total 20A system flow change
10. Oct 2004 – Mid Feb 2009 Lowered upper reservoir from 23.34 ft to 18.84 ft Oct 2004

Hg concentrations at end of this simulation as initial for next simulation with Area B remediation startup Feb 2009.

2008 ACMUA WELL PUMPING RATES

ACMUA PUMPING RATES

2008	# 3 Well	# 12 Well	# 14 Well	# 25 Well	# 16 Well	# 17 Well	# 18 Well	# 19 Well
	MG Pumped	MG Pumped	MG Pumped	MG Pumped	MG Pumped	MG Pumped	MG Pumped	MG Pumped
January	0.0000	1.2555	7.7400	0.0000	19.5330	32.6910	31.0800	38.0400
February	0.0000	0.0000	15.8400	17.9010	8.5680	21.1650	27.6600	31.8600
March	0.0000	0.0000	8.0550	11.3220	25.2960	29.4270	33.7800	25.8000
1st Quarter	0.0000	1.2555	31.6350	29.2230	53.3970	83.2830	92.5200	95.7000

2008	# 20 Well	# 21 Well	# 22 Well	# 23 Well	# 24 Well	Monthly	Reservoir
	MG Pumped	MG Pumped	MG Pumped	MG Pumped	MG Pumped	Totals MG	MG Pumped
January	12.7260	34.7820	40.8330	42.3600	18.1260	279.1665	44.4775
February	0.0000	25.1940	36.9135	35.9400	28.1010	249.1425	57.4309
March	0.0000	33.7110	37.0305	40.9800	36.3660	281.7675	46.9871
1st Quarter	12.7260	93.6870	114.7770	119.2800	82.5930	810.0765	148.8955

ACMUA PUMPING RATES

2008	# 3 Well	# 12 Well	# 14 Well	# 25 Well	# 16 Well	# 17 Well	# 18 Well	# 19 Well
	MG Pumped	MG Pumped	MG Pumped	MG Pumped	MG Pumped	MG Pumped	MG Pumped	MG Pumped
April	0.0000	3.4875	2.2950	1.8870	30.4980	32.9460	31.9800	27.3000
May	0.0000	4.5105	13.7700	17.5950	27.6420	29.1720	30.4200	17.4000
June	0.0000	7.5330	23.5350	12.1380	29.6310	33.3540	33.7800	25.5000
2nd Quarter	0.0000	15.5310	39.6000	31.6200	87.7710	95.4720	96.1800	70.2000

2008	# 20 Well	# 21 Well	# 22 Well	# 23 Well	# 24 Well	Monthly	Reservoir
	MG Pumped	MG Pumped	MG Pumped	MG Pumped	MG Pumped	Totals MG	MG Pumped
April	0.0000	33.0480	39.3705	36.8400	34.7700	274.4220	44.7299
May	0.0000	33.9660	39.0780	38.7000	32.3190	284.5725	69.3423
June	17.1990	26.9790	35.0415	36.6000	36.7080	317.9985	89.4031
2nd Quarter	17.1990	93.9930	113.4900	112.1400	103.7970	876.9930	203.4753

ACMUA PUMPING RATES

2008	# 3 Well	# 12 Well	# 14 Well	# 25 Well	# 16 Well	# 17 Well	# 18 Well	# 19 Well
	MG Pumped	MG Pumped	MG Pumped	MG Pumped	MG Pumped	MG Pumped	MG Pumped	MG Pumped
July	13.7400	21.9945	26.5950	18.8700	31.3650	35.4960	35.5800	40.6800
August	8.3400	15.1590	28.2600	29.9880	34.5780	35.5470	42.0600	42.1800
September	0.0000	16.8330	20.4750	36.1080	33.6600	35.6490	30.4200	23.0400
3rd Quarter	22.0800	53.9865	75.3300	84.9660	99.6030	106.6920	108.0600	105.9000

2008	# 20 Well	# 21 Well	# 22 Well	# 23 Well	# 24 Well	Monthly	Reservoir
	MG Pumped	MG Pumped	MG Pumped	MG Pumped	MG Pumped	Totals MG	MG Pumped
July	31.6260	31.9770	41.3010	35.5800	40.9260	405.7305	91.0585
August	35.8470	34.7310	41.1840	43.0800	32.7750	423.7290	71.5818
September	21.4830	30.7530	35.1000	37.9800	34.5990	356.1000	63.2880
3rd Quarter	88.9560	97.4610	117.5850	116.6400	108.3000	1185.5595	225.9283

ACMUA PUMPING RATES

2008	# 3 Well	# 12 Well	# 14 Well	# 25 Well	# 16 Well	# 17 Well	# 18 Well	# 19 Well
	MG Pumped	MG Pumped	MG Pumped	MG Pumped	MG Pumped	MG Pumped	MG Pumped	MG Pumped
October	0.0000	2.8830	28.5300	33.7110	23.0520	22.8480	31.3200	0.0000
November	0.0000	3.9990	25.7400	22.9500	12.0360	16.5750	22.7400	6.3600
December	0.0000	4.0455	28.4400	34.5780	21.9810	23.7150	23.8800	12.3000
4th Quarter	0.0000	10.9275	82.7100	91.2390	57.0690	63.1380	77.9400	18.6600
	1016 gpm	1040 gpm	1056 gpm	1089 gpm	1500 gpm	1500 gpm	1500 gpm	1500 gpm

2008	# 20 Well	# 21 Well	# 22 Well	# 23 Well	# 24 Well	Monthly	Reservoir
	MG Pumped	MG Pumped	MG Pumped	MG Pumped	MG Pumped	Totals MG	MG Pumped
October	22.8690	27.1320	38.6100	34.9800	39.3870	305.3220	56.0373
November	25.3260	29.8860	33.9300	30.8400	23.9970	254.3790	72.0404
December	9.7020	14.0760	32.4675	27.3600	25.5360	258.0810	53.8428
4th Quarter	57.8970	71.0940	105.0075	93.1800	88.9200	817.7820	181.9205

AREA 20A REMEDIATION SYSTEM PUMPING RATES

1992 – 2004 and JANUARY 2008 – JANUARY 2011

AREA 20A REMEDIATION SYSTEM PUMPING RATES
1992 - 2004

Year	EW-1	EW-2	EW-3	Shallow System	Basin/Inj. Wells
Jan. 1992 (IRM system startup)	85	140	105	---	100% basin
July 1992	50	120	95	---	100% basin
March 1993	50/50% cycle	137	100/50% cycle	---	100% basin
1996 (shallow system began)	50	137	100	~53	170 basin 150 inj.
1998	Total of 295 for entire system (no information on distribution)	---	---	---	220 basin 100 inj.
Jan. 2004	Total of ~222 gpm for entire system (approx. 200 deep and 20 shallow)	---	---	~20	70% basin 30% inj.

All rates are in gallons per minute (gpm).
"50% cycle" is defined as wells pumping 50% of the time during any given time period (i.e., pumping 12 hours out of a 24-hour day).

Jan-08

EXTRACTION WELL#	OUTSIDE FLOW TOTALIZER 12/28/2007	INSIDE FLOW TOTALIZER 12/28/2007	OUTSIDE FLOW TOTALIZER 1/31/2008	INSIDE FLOW TOTALIZER 1/31/2008	Outside Flow Totals	Inside Flow Totals	GPM
EW2S	2,240,200	2,320,080	2,284,100	2,362,240	43,900	42,160	0.86
EW3S	4,401,800	109,890	4,401,800	110,720	0	830	0.02
EW4S	2,386,800	2,383,890	2,387,100	2,383,890	300	0	0.01
EW5S	removed	253,050	removed	272,730	0	19,680	0.40
EW6S	removed	1,092,980	removed	1,131,290	0	38,310	0.78
EW7S	0	1,014,680	0	1,060,280	0	45,600	0.93
EW8S	removed	96,870	removed	120,960	0	24,090	0.49
EW9S	removed	1,028,270	removed	1,119,190	0	90,920	1.86
EW10S	7,109,200	7,156,890	7,125,200	7,172,870	16,000	15,980	0.33
EW11S	9,113,800	912,430	9,113,800	912,480	0	50	0.00
EW12S	1,559,200	19,630	1,559,200	102,580	0	0	0.00
EW13S	4,822,500	729,280	4,822,500	775,370	0	46,090	0.94
EW14S	removed	456,150	removed	456,150	0	0	0.00
EW15S	1,100	206,070	1,100	213,580	0	7,510	0.15
EW16S	6,348,100	6,348,100	6,481,800	6,481,030	133,700	132,930	2.73
EW17S	80,400	80,400	80,400	80,400	0	0	0.00
EW18S	4,890,530	4,825,000	4,978,900	4,946,210	88,370	121,210	1.80
EW19S	off	off	off	off	0	0	0.00
						585,660	11.31

	Days	34			
	Minutes	48960			
	12/28/2007		1/31/2008	**Total Flow**	**GPM**
PO-1				585,660	11.96

DATE	**EW-1**	**EW-2**	**EW-3**
12/28/2007	59667100	69351000	13353200
12/28/2007	57878400	65418900	9076100
Total Flow	1788700	3932100	4277100
GPM	36.53	80.31	87.36

	Air Stripper	
1/31/2008	63041866	
12/28/2007	51955124	
	11086742	**GPM**
Total Flow	11086742	226.444894

Feb-08

EXTRACTION WELL#	OUTSIDE FLOW TOTALIZER 1/31/2008	INSIDE FLOW TOTALIZER 1/31/2008	OUTSIDE FLOW TOTALIZER 2/29/2008	INSIDE FLOW TOTALIZER 2/29/2008	Outside Flow Totals	Inside Flow Totals	GPM
EW2S	2,284,100	2,362,240	2,331,900	2,412,360	47,800	50,120	1.20
EW3S	4,401,800	110,720	4,401,800	127,650	0	16,930	0.41
EW4S	2,387,100	2,383,890	2,409,700	condensation	22,600	0	0.54
EW5S	removed	272,730	removed	301,510	0	28,780	0.69
EW6S	removed	0	removed	32,500	0	32,500	0.78
EW7S	0	1,060,280	0	1,108,810	0	48,530	1.16
EW8S	removed	120,960	removed	142,420	0	21,460	0.51
EW9S	removed	0	removed	21,460	0	21,460	0.51
EW10S	7,125,200	7,172,870	7,165,800	7,211,470	40,600	38,600	0.97
EW11S	9,113,800	912,480	9,206,600	condensation	92,800	0	2.22
EW12S	1,559,200	0	1,559,200	34,660	0	34,660	0.83
EW13S	4,822,500	775,370	4,822,500	811,130	0	35,760	0.86
EW14S	removed	456,150	removed	456,150	0	0	0.00
EW15S	1,100	213,580	1,100	253,720	0	40,140	0.96
EW16S	6,481,800	6,481,030	6,624,900	6,625,320	143,100	144,290	3.43
EW17S	80,400	80,400	80,400	80,400	0	0	0.00
EW18S	4,978,900	4,946,210	4,978,900	4,991,670	0	45,460	0.00
EW19S	off	off	off	off	0	0	0.00
						674,090	15.07

Days 29
Minutes 41760

	1/31/2008	2/29/2008	Total Flow	GPM
PO-1			674,090	16.14

DATE	EW-1	EW-2	EW-3
1/31/2008	61314500	72979800	17371000
1/31/2008	59667100	69351000	13353200
Total Flow	1647400	3628800	4017800
GPM	39.45	86.90	96.21

	Air Stripper	GPM
2/29/2008	73573343	
1/31/2008	63041866	
	10531477	
Total Flow	10531477	252.190541

Mar-08

EXTRACTION WELL#	OUTSIDE FLOW TOTALIZER 2/29/2008	INSIDE FLOW TOTALIZER 2/29/2008	OUTSIDE FLOW TOTALIZER 3/31/2008	INSIDE FLOW TOTALIZER 3/31/2008	Outside Flow Totals	Inside Flow Totals	GPM
EW2S	2,331,900	2,412,360	2,389,000	2,469,460	57,100	57,100	1.28
EW3S	4,401,800	127,650	4,401,800	197,960	0	70,310	1.58
EW4S	2,409,700	condensation	2,444,800	2,441,280	35,100	0	0.79
EW5S	removed	301,510	32,100	332,570	0	31,060	0.70
EW6S	removed	32,500	4,612,300	74,600	0	42,100	0.94
EW7S	0	1,108,810	0	1,151,210	0	42,400	0.95
EW8S	removed	142,420	1,033,000	165,230	0	22,810	0.51
EW9S	removed	21,460	removed	169,550	0	148,090	3.32
EW10S	7,165,800	7,211,470	7,181,000	7,228,620	15,200	17,150	0.34
EW11S	9,206,600	condensation	9,329,000	9,327,800	122,400	0	2.74
EW12S	1,559,200	34,660	1,559,200	114,140	0	79,480	1.78
EW13S	4,822,500	811,130	4,822,500	859,420	0	48,290	1.08
EW14S	removed	456,150	removed	456,150	0	0	0.00
EW15S	1,100	253,720	1,100	306,300	0	52,580	1.18
EW16S	6,624,900	6,625,320	6,782,900	6,782,410	158,000	157,090	3.54
EW17S	80,400	80,400	80,400	80,400	0	0	0.00
EW18S	4,978,900	4,991,670	4,979,100	5,050,190	200	58,520	0.00
EW19S	off	off	off	off	0	0	0.00
						984,480	20.72

Days 31
Minutes 44640

	2/29/2008	3/31/2008	Total Flow	GPM
PO-1			984,480	22.05

DATE	EW-1	EW-2	EW-3
3/31/2008	63079200	76830400	21645100
2/29/2008	61314500	72979800	17371000
Total Flow	1764700	3850600	4274100
GPM	39.53	86.26	95.75

	Air Stripper	
3/31/2008	85083686	
2/29/2008	73573343	
	11510343	GPM
Total Flow	11510343	257.848185

Apr-08

	3/31/2008		4/30/2008				
EXTRACTION WELL#	OUTSIDE FLOW TOTALIZER	INSIDE FLOW TOTALIZER	OUTSIDE FLOW TOTALIZER	INSIDE FLOW TOTALIZER	Outside Flow Totals	Inside Flow Totals	GPM
EW2S	2,389,000	2,469,460	2,444,200	2,524,950	55,200	55,490	1.28
EW3S	4,401,800	197,960	4,401,800	319,360	0	121,400	2.81
EW4S	2,444,800	2,441,280	2,461,100	2,457,080	16,300	15,800	0.38
EW5S	32,100	332,570	32,100	369,650	0	37,080	0.86
EW6S	4,612,300	74,600	4,612,300	156,110	0	81,510	1.89
EW7S	0	1,151,210	0	1,201,600	0	50,390	1.17
EW8S	1,033,000	165,230	1,033,000	187,540	0	22,310	0.52
EW9S	removed	169,550	removed	330,620	0	161,070	3.73
EW10S	7,181,000	7,228,620	7,181,000	7,228,630	0	10	0.00
EW11S	9,329,000	9,327,800	9,448,200	9,446,420	119,200	118,620	2.76
EW12S	1,559,200	114,140	1,559,200	189,710	0	75,570	1.75
EW13S	4,822,500	859,420	4,822,500	911,070	0	51,650	1.20
EW14S	removed	456,150	removed	456,150	0	0	0.00
EW15S	1,100	306,300	1,100	357,020	0	50,720	1.17
EW16S	6,782,900	6,782,410	6,941,300	6,940,770	158,400	158,360	3.67
EW17S	80,400	80,400	80,400	80,400	0	0	0.00
EW18S	4,979,100	5,050,190	5,035,160	5,108,210	56,060	58,020	1.30
EW19S	off	off	off	off	0	0	0.00
						1,193,500	24.47

	Days	30		
	Minutes	43200		
	3/31/2008	4/30/2008	Total Flow	GPM
PO-1			1,193,500	27.63

DATE	EW-1	EW-2	EW-3
4/30/2008	64829400	80619200	25810700
3/31/2008	63079200	76830400	21645100
Total Flow	1750200	3788800	4165600
GPM	40.51	87.70	96.43

	Air Stripper	
4/30/2008	96509999	
3/31/2008	85083686	
	11426313	GPM
Total Flow	11426313	264.497986

May-08

EXTRACTION WELL#	4/30/2008 OUTSIDE FLOW TOTALIZER	4/30/2008 INSIDE FLOW TOTALIZER	5/30/2008 OUTSIDE FLOW TOTALIZER	5/30/2008 INSIDE FLOW TOTALIZER	Outside Flow Totals	Inside Flow Totals	GPM
EW2S	2,444,200	2,524,950	2,495,400	2,575,810	51,200	50,860	1.18
EW3S	4,401,800	319,360	4,401,800	385,140	0	65,780	1.52
EW4S	2,461,100	2,457,080	2,498,900	2,495,430	37,800	38,350	0.88
EW5S	32,100	369,650	32,100	413,960	0	44,310	1.03
EW6S	4,612,300	156,110	4,612,300	241,480	0	85,370	1.98
EW7S	0	1,201,600	0	1,242,820	0	41,220	0.95
EW8S	1,033,000	187,540	1,033,000	209,210	0	21,670	0.50
EW9S	removed	330,620	removed	488,540	0	157,920	3.66
EW10S	7,181,000	7,228,630	7,181,000	7,228,630	0	0	0.00
EW11S	9,448,200	9,446,420	9,448,200	9,559,590	0	113,170	0.00
EW12S	1,559,200	189,710	1,559,200	228,540	0	38,830	0.90
EW13S	4,822,500	911,070	4,822,500	964,590	0	53,520	1.24
EW14S	removed	456,150	removed	456,150	0	0	0.00
EW15S	1,100	357,020	1,100	407,290	0	50,270	1.16
EW16S	6,941,300	6,940,770	7,095,100	7,094,590	153,800	153,820	3.56
EW17S	80,400	80,400	80,400	80,400	0	0	0.00
EW18S	5,035,160	5,108,210	5,154,420	5,228,300	119,260	120,090	2.76
EW19S	off	off	off	off	0	0	0.00
						1,072,980	21.31

Days 30
Minutes 43200

	4/30/2008	5/30/2008	Total Flow	GPM
PO-1			1,072,980	24.84

DATE	EW-1	EW-2	EW-3
5/30/2008	66571900	84434600	30003000
4/30/2008	64829400	80619200	25810700
Total Flow	1742500	3815400	4192300
GPM	40.34	88.32	97.04

	Air Stripper	
5/30/2008	107856708	
4/30/2008	96509999	
	11346709	GPM
Total Flow	11346709	262.655301

Jun-08

EXTRACTION WELL#	5/30/2008 OUTSIDE FLOW TOTALIZER	INSIDE FLOW TOTALIZER	6/30/2008 OUTSIDE FLOW TOTALIZER	INSIDE FLOW TOTALIZER	Outside Flow Totals	Inside Flow Totals	GPM
EW2S	2,495,400	2,575,810	2,547,000	2,627,400	51,600	51,590	1.16
EW3S	4,401,800	385,140	4,401,800	452,240	0	67,100	1.50
EW4S	2,498,900	2,495,430	2,539,000	2,535,400	40,100	39,970	0.90
EW5S	32,100	413,960	32,100	462,450	0	48,490	1.09
EW6S	4,612,300	241,480	4,612,300	323,300	0	81,820	1.83
EW7S	0	1,242,820	0	1,305,530	0	62,710	1.40
EW8S	1,033,000	209,210	1,033,000	232,410	0	23,200	0.52
EW9S	removed	488,540	removed	647,550	0	159,010	3.56
EW10S	7,181,000	7,228,630	7,181,000	7,228,630	0	0	0.00
EW11S	9,448,200	9,559,590	9,680,800	9,679,570	232,600	119,980	5.21
EW12S	1,559,200	228,540	1,559,200	285,720	0	57,180	1.28
EW13S	4,822,500	964,590	4,822,500	1,014,640	0	50,050	1.12
EW14S	removed	456,150	removed	456,150	0	0	0.00
EW15S	1,100	407,290	1,100	458,880	0	51,590	1.16
EW16S	7,095,100	7,094,590	7,255,600	7,255,160	160,500	160,570	3.60
EW17S	80,400	80,400	80,400	80,400	0	0	0.00
EW18S	cond	5,083,300	cond	5,192,240	#VALUE!	108,940	#VALUE!
EW19S	off	off	off	off	0	0	0.00
						1,082,200	#VALUE!

	Days	31			
	Minutes	44640			
	5/30/2008		6/30/2008	Total Flow	GPM
PO-1				1,082,200	24.24

DATE	EW-1	EW-2	EW-3
6/30/2008	68348600	88394200	33847000
5/30/2008	66571900	84434600	30003000
Total Flow	1776700	3959600	3844000
GPM	39.80	88.70	86.11

	Air Stripper	
6/30/2008	18981992	
5/30/2008	7856708	
	11125284	GPM
Total Flow	11125284	249.222312

Jul-08

EXTRACTION WELL#	6/30/2008 OUTSIDE FLOW TOTALIZER	INSIDE FLOW TOTALIZER	7/31/2008 OUTSIDE FLOW TOTALIZER	INSIDE FLOW TOTALIZER	Outside Flow Totals	Inside Flow Totals	GPM
EW2S	2,547,000	2,627,400	2,547,000	2,668,110	0	40,710	0.91
EW3S	4,401,800	452,240	4,401,800	514,650	0	62,410	1.40
EW4S	2,539,000	2,535,400	2,578,500	2,575,000	39,500	39,600	0.88
EW5S	32,100	462,450	32,100	499,120	0	36,670	0.82
EW6S	4,612,300	323,300	4,612,300	399,250	0	75,950	1.70
EW7S	0	1,305,530	0	1,305,530	0	0	0.00
EW8S	1,033,000	232,410	1,033,000	255,250	0	22,840	0.51
EW9S	removed	647,550	removed	708,540	0	60,990	1.37
EW10S	7,181,000	7,228,630	7,181,000	7,228,630	0	0	0.00
EW11S	9,680,800	9,679,570	9,680,800	9,798,170	0	118,600	0.00
EW12S	1,559,200	285,720	1,559,200	329,040	0	43,320	0.97
EW13S	4,822,500	1,014,640	4,822,500	1,099,310	0	84,670	1.90
EW14S	removed	456,150	removed	456,150	0	0	0.00
EW15S	1,100	458,880	1,100	507,430	0	48,550	1.09
EW16S	7,255,600	7,255,160	7,414,700	7,414,240	159,100	159,080	3.56
EW17S	80,400	80,400	80,400	80,400	0	0	0.00
EW18S	cond	5,192,240	5,146,600	5,217,660	#VALUE!	25,420	#VALUE!
EW19S	off	off	off	off	0	0	0.00
						818,810	#VALUE!

Days	31				
Minutes	44640				
	6/30/2008		7/31/2008	Total Flow	GPM
PO-1				818,810	18.34

DATE	EW-1	EW-2	EW-3
7/31/2008	70094300	92297800	37962100
6/30/2008	68348600	88394200	33847000
Total Flow	1745700	3903600	4115100
GPM	39.11	87.45	92.18

	Air Stripper	
7/31/2008	30149013	
6/30/2008	18981992	
	11167021	GPM
Total Flow	11167021	250.15728

Aug-08

EXTRACTION WELL#	OUTSIDE FLOW TOTALIZER 7/31/2008	INSIDE FLOW TOTALIZER 7/31/2008	OUTSIDE FLOW TOTALIZER 8/29/2008	INSIDE FLOW TOTALIZER 8/29/2008	Outside Flow Totals	Inside Flow Totals	GPM
EW2S	2,547,000	2,668,110	2,547,000	2,717,290	0	49,180	1.18
EW3S	4,401,800	514,650	4,401,800	567,630	0	52,980	1.27
EW4S	2,578,500	2,575,000	2,597,200	2,593,710	18,700	18,710	0.45
EW5S	32,100	499,120	32,100	499,120	0	0	0.00
EW6S	4,612,300	399,250	4,612,300	475,220	0	75,970	1.82
EW7S	0	1,305,530	0	1,338,810	0	33,280	0.80
EW8S	1,033,000	255,250	1,033,000	276,180	0	20,930	0.50
EW9S	removed	708,540	removed	753,870	0	45,330	1.09
EW10S	7,181,000	7,228,630	7,181,000	7,228,630	0	0	0.00
EW11S	9,680,800	9,798,170	9,908,900	9,907,670	228,100	109,500	5.46
EW12S	1,559,200	329,040	1,559,200	340,750	0	11,710	0.28
EW13S	4,822,500	1,099,310	4,822,500	1,171,000	0	71,690	1.72
EW14S	removed	456,150	removed	456,150	0	0	0.00
EW15S	1,100	507,430	1,100	546,070	0	38,640	0.93
EW16S	7,414,700	7,414,240	7,557,500	7,557,010	142,800	142,770	3.42
EW17S	80,400	80,400	80,400	80,400	0	0	0.00
EW18S	5,146,600	5,217,660	5,175,800	5,246,930	29,200	29,270	0.70
EW19S	off	off	off	off	0	0	0.00
						699,960	19.60

Days 29

Minutes 41760

	7/31/2008	8/29/2008	Total Flow	GPM
PO-1			699,960	16.76

DATE	EW-1	EW-2	EW-3
8/29/2008	71751200	96024400	42067500
7/31/2008	70094300	92297800	37962100
Total Flow	1656900	3726600	4105400
GPM	39.68	89.24	98.31

	Air Stripper	
8/29/2008	40691920	
7/31/2008	30149013	
	10542907	GPM
Total Flow	10542907	252.464248

Sep-08

	8/29/2008		9/30/2008				
EXTRACTION WELL#	OUTSIDE FLOW TOTALIZER	INSIDE FLOW TOTALIZER	OUTSIDE FLOW TOTALIZER	INSIDE FLOW TOTALIZER	Outside Flow Totals	Inside Flow Totals	GPM
EW2S	2,547,000	2,717,290	2,582,000	2,769,900	35,000	52,610	1.14
EW3S	4,401,800	567,630	4,401,800	623,010	0	55,380	1.20
EW4S	2,597,200	2,593,710	2,615,400	2,611,900	18,200	18,190	0.39
EW5S	32,100	499,120	32,100	528,890	0	29,770	0.65
EW6S	4,612,300	475,220	4,612,300	550,260	0	75,040	1.63
EW7S	0	1,338,810	0	1,370,480	0	31,670	0.69
EW8S	1,033,000	276,180	1,033,000	298,640	0	22,460	0.49
EW9S	removed	753,870	removed	802,010	0	48,140	1.04
EW10S	7,181,000	7,228,630	7,181,000	7,228,610	0	-20	0.00
EW11S	9,908,900	9,907,670	10,025,300	10,024,030	116,400	116,360	2.53
EW12S	1,559,200	340,750	1,559,200	340,750	0	0	0.00
EW13S	4,822,500	1,171,000	4,822,500	1,214,410	0	43,410	0.94
EW14S	removed	456,150	removed	456,150	0	0	0.00
EW15S	1,100	546,070	1,100	583,350	0	37,280	0.81
EW16S	7,557,500	7,557,010	7,712,300	7,711,800	154,800	154,790	3.36
EW17S	80,400	80,400	80,400	80,400	0	0	0.00
EW18S	5,175,800	5,246,930	5,211,500	5,282,630	35,700	35,700	0.77
EW19S	off	off	off	off	0	0	0.00
						720,780	15.64

Days 32
Minutes 46080

	8/29/2008	9/30/2008	Total Flow	GPM
PO-1			720,780	15.64

DATE	EW-1	EW-2	EW-3
9/30/2008	73563200	100098100	46436700
8/29/2008	71751200	96024400	42067500
Total Flow	1812000	4073700	4369200
GPM	39.32	88.40	94.82

	Air Stripper	
9/30/2008	52091237	
8/29/2008	40691920	
	11399317	GPM
Total Flow	11399317	247.381011

Oct-08

EXTRACTION WELL#	OUTSIDE FLOW TOTALIZER 9/30/2008	INSIDE FLOW TOTALIZER 9/30/2008	OUTSIDE FLOW TOTALIZER 10/31/2008	INSIDE FLOW TOTALIZER 10/31/2008	Outside Flow Totals	Inside Flow Totals	GPM
EW2S	2,582,000	2,769,900	2,584,600	2,804,840	2,600	34,940	0.78
EW3S	4,401,800	623,010	4,401,800	640,350	0	17,340	0.39
EW4S	2,615,400	2,611,900	2,627,300	2,623,770	11,900	11,870	0.27
EW5S	32,100	528,890	32,100	536,170	0	7,280	0.16
EW6S	4,612,300	550,260	4,612,300	571,930	0	21,670	0.49
EW7S	0	1,370,480	0	1,692,710	0	322,230	7.22
EW8S	1,033,000	0	1,033,000	9,200	0	9,200	0.21
EW9S	removed	0	removed	1,260	0	1,260	0.03
EW10S	7,181,000	7,228,610	7,181,000	7,228,610	0	0	0.00
EW11S	25,300	24,030	124,200	condensation	98,900	0	2.22
EW12S	1,559,200	340,750	1,559,200	340,750	0	0	0.00
EW13S	4,822,500	1,214,410	4,822,500	1,231,280	0	16,870	0.38
EW14S	removed	456,150	removed	456,150	0	0	0.00
EW15S	1,100	583,350	1,100	616,080	0	32,730	0.73
EW16S	7,712,300	7,711,800	7,843,700	7,833,110	131,400	121,310	2.94
EW17S	80,400	80,400	80,400	80,400	0	0	0.00
EW18S	5,211,500	5,282,630	5,241,300	5,312,000	29,800	29,370	0.67
EW19S	off	off	off	off	0	0	0.00
						724,970	16.48

Days 31
Minutes 44640

	9/30/2008	10/31/2008	Total Flow	GPM
PO-1			724,970	16.24

DATE	EW-1	EW-2	EW-3
10/31/2008	75507600	3577800	50077000
9/30/2008	73563200	98100	46436700
Total Flow	1944400	3479700	3640300
GPM	43.56	77.95	81.55

	Air Stripper	
10/31/2008	61650150	
9/30/2008	52091237	
	9558913	GPM
Total Flow	9558913	214.133356

Nov-08

EXTRACTION WELL#	10/31/2008 OUTSIDE FLOW TOTALIZER	INSIDE FLOW TOTALIZER	11/26/2008 OUTSIDE FLOW TOTALIZER	INSIDE FLOW TOTALIZER	Outside Flow Totals	Inside Flow Totals	GPM
EW2S	2,584,600	2,804,840	2,584,600	2,815,500	0	10,660	0.28
EW3S	4,401,800	640,350	4,401,800	664,220	0	23,870	0.64
EW4S	2,627,300	2,623,770	2,627,300	2,624,030	0	260	0.00
EW5S	32,100	536,170	32,100	544,350	0	8,180	0.22
EW6S	4,612,300	571,930	4,612,300	591,920	0	19,990	0.53
EW7S	0	1,692,710	0	1,834,710	0	142,000	3.79
EW8S	1,033,000	9,200	1,033,000	36,960	0	27,760	0.74
EW9S	removed	1,260	removed	14,420	0	13,160	0.35
EW10S	7,181,000	7,228,610	7,181,000	7,228,610	0	0	0.00
EW11S	124,200	condensation	225,300	224,170	101,100	0	2.70
EW12S	1,559,200	340,750	1,559,200	340,750	0	0	0.00
EW13S	4,822,500	1,231,280	4,822,500	1,248,180	0	16,900	0.45
EW14S	removed	456,150	removed	456,150	0	0	0.00
EW15S	1,100	616,080	1,100	657,750	0	41,670	1.11
EW16S	7,843,700	7,833,110	7,971,200	7,966,440	127,500	133,330	3.41
EW17S	80,400	80,400	80,400	80,400	0	0	0.00
EW18S	5,241,300	5,312,000	5,267,600	5,334,100	26,300	22,100	0.70
EW19S	off	off	off	off	0	0	0.00
						560,980	14.93

	Days	26			
	Minutes	37440			
	10/31/2008		11/26/2008	Total Flow	GPM
PO-1				560,980	14.98

DATE	EW-1	EW-2	EW-3
11/26/2008	76601300	6943800	53666900
10/31/2008	75007600	3577800	50077000
Total Flow	1593700	3366000	3589900
GPM	42.57	89.90	95.88

	Air Stripper	
11/26/2008	70978975	
10/31/2008	61650150	
	9328825	GPM
Total Flow	9328825	249.167334

Dec-08

	11/26/2008		12/30/2008					
EXTRACTION WELL#	OUTSIDE FLOW TOTALIZER	INSIDE FLOW TOTALIZER	OUTSIDE FLOW TOTALIZER	INSIDE FLOW TOTALIZER	Outside Flow Totals	Inside Flow Totals		GPM
EW2S	2,584,600	2,815,500	2,584,600	2,884,960	0	69,460		1.42
EW3S	4,401,800	664,220	4,401,800	667,130	0	2,910		0.06
EW4S	2,627,300	2,624,030	2,627,300	2,728,000	0	103,970		0.00
EW5S	32,100	544,350	32,100	578,350	0	34,000		0.69
EW6S	4,612,300	591,920	4,612,300	662,800	0	70,880		1.45
EW7S	0	1,441,740	0	1,467,790	0	26,050		0.53
EW8S	1,033,000	36,960	1,033,000	70,490	0	33,530		0.68
EW9S	removed	14,420	removed	29,440	0	15,020		0.31
EW10S	7,181,000	7,228,610	7,181,000	7,228,610	0	0		0.00
EW11S	225,300	224,170	225,300	227,450	0	3,280		0.00
EW12S	1,559,200	0	1,559,200	33,110	0	33,110		0.68
EW13S	4,822,500	1,248,180	4,822,500	1,262,550	0	14,370		0.29
EW14S	removed	456,150	removed	456,150	0	0		0.00
EW15S	1,100	657,750	1,100	711,920	0	54,170		1.11
EW16S	7,971,200	7,966,440	7,971,200	8,062,200	0	95,760		0.00
EW17S	80,400	80,400	80,400	80,400	0	0		0.00
EW18S	5,267,600	5,334,100	5,267,600	5,346,410	0	12,310		0.00
EW19S	off	off	off	off	0	0		0.00
						568,820		7.22

	Days	34			
	Minutes	48960			
	11/26/2008		12/30/2008	Total Flow	GPM
PO-1				568,820	11.62

DATE	EW-1	EW-2	EW-3
12/30/2008	78872000	11416200	58451000
11/26/2008	76601300	6943800	53666900
Total Flow	2270700	4472400	4784100
GPM	46.38	91.35	97.71

	Air Stripper	
12/30/2008	83315385	
11/26/2008	70978975	
	12336410	GPM
Total Flow	12336410	251.969158

Jan-09

	12/30/2008		1/30/2009				
EXTRACTI ON WELL#	OUTSIDE FLOW TOTALIZER	INSIDE FLOW TOTALIZER	OUTSIDE FLOW TOTALIZER	INSIDE FLOW TOTALIZER	Outside Flow Totals	Inside Flow Totals	GPM
EW2S	2,584,600	2,884,960	2,584,600	2,921,120	0	36,160	0.81
EW3S	4,401,800	667,130	4,401,800	684,280	0	17,150	0.38
EW4S	2,627,300	2,728,000	2,631,400	Condensation	4,100	0	0.09
EW5S	32,100	578,350	32,100	614,130	0	35,780	0.80
EW6S	4,612,300	662,800	4,612,300	726,480	0	63,680	1.43
EW7S	0	1,467,790	0	1,497,020	0	29,230	0.65
EW8S	1,033,000	70,490	1,033,000	100,860	0	30,370	0.68
EW9S	removed	29,440	removed	51,970	0	22,530	0.50
EW10S	7,181,000	7,228,610	7,181,000	7,228,610	0	0	0.00
EW11S	225,300	227,450	482,900	277,710	257,600	50,260	5.77
EW12S	1,559,200	33,110	1,559,200	83,220	0	0	0.00
EW13S	4,822,500	1,262,550	4,822,500	1,271,390	0	8,840	0.20
EW14S	removed	456,150	removed	456,150	0	0	0.00
EW15S	1,100	711,920	1,100	760,510	0	48,590	1.09
EW16S	7,971,200	8,062,200	7,971,200	8,218,140	0	155,940	0.00
EW17S	80,400	80,400	80,400	80,400	0	0	0.00
EW18S	5,267,600	5,346,410	5,288,600	5,350,740	21,000	4,330	0.47
EW19S	off	off	off	off	0	0	0.00
						506,960	12.88

	Days	31			
	Minutes	44640			
	12/30/2008		1/30/2009	Total Flow	GPM
PO-1				506,960	11.36

DATE	EW-1	EW-2	EW-3
1/30/2009	80411900	15485600	62803000
12/30/2008	78872000	11416200	58451000
Total Flow	1539900	4069400	4352000
GPM	34.50	91.16	97.49

	Air Stripper	
1/30/2009	94673545	
12/30/2008	83315385	
	11358160	GPM
Total Flow	11358160	254.439068

Feb-09

EXTRACTION WELL#	OUTSIDE FLOW TOTALIZER 1/30/2009	INSIDE FLOW TOTALIZER 1/30/2009	OUTSIDE FLOW TOTALIZER 2/27/2009	INSIDE FLOW TOTALIZER 2/27/2009	Outside Flow Totals	Inside Flow Totals	GPM
EW2S	2,584,600	2,921,120	2,584,600	3,014,250	0	93,130	2.31
EW3S	4,401,800	684,280	4,401,800	703,520	0	19,240	0.48
EW4S	2,631,400	Condensation	2,633,000	2,649,650	1,600	0	0.04
EW5S	32,100	614,130	32,100	639,260	0	25,130	0.62
EW6S	4,612,300	726,480	4,612,300	733,880	0	7,400	0.18
EW7S	0	1,497,020	0	1,528,580	0	31,560	0.78
EW8S	1,033,000	100,860	1,033,000	127,370	0	26,510	0.66
EW9S	removed	51,970	removed	85,760	0	33,790	0.84
EW10S	7,181,000	7,228,610	7,181,000	7,228,630	0	20	0.00
EW11S	482,900	277,710	607,100	condensation	124,200	0	3.08
EW12S	1,559,200	83,220	1,559,200	106,810	0	23,590	0.59
EW13S	4,822,500	1,271,390	4,822,500	1,271,590	0	200	0.00
EW14S	removed	456,150	removed	456,150	0	0	0.00
EW15S	1,100	760,510	1,100	810,790	0	50,280	1.25
EW16S	7,971,200	8,218,140	8,349,700	8,349,130	378,500	130,990	9.39
EW17S	80,400	80,400	80,400	80,400	0	0	0.00
EW18S	5,288,600	5,350,740	5,288,600	5,359,730	0	8,990	0.00
EW19S	off	off	off	off	0	0	0.00
						576,630	20.22

	Days	28			
	Minutes	40320			
	1/30/2009		2/27/2009	Total Flow	GPM
PO-1				576,630	14.30

DATE	EW-1	EW-2	EW-3
2/27/2009	81999500	19044000	66603600
1/30/2009	80411900	15485600	62803000
Total Flow	1587600	3558400	3800600
GPM	39.38	88.25	94.26

	Air Stripper	
2/27/2009	104632133	
1/30/2009	94673545	
	9958588	GPM
Total Flow	9958588	246.98879

Mar-09

EXTRACTION WELL#	OUTSIDE FLOW TOTALIZER 2/27/2009	INSIDE FLOW TOTALIZER 2/27/2009	OUTSIDE FLOW TOTALIZER 3/31/2009	INSIDE FLOW TOTALIZER 3/31/2009	Outside Flow Totals	Inside Flow Totals	GPM
EW2S	2,584,300	3,014,250	2,584,300	3,086,310	0	72,060	1.56
EW3S	4,401,800	703,520	4,401,800	709,650	0	6,130	0.13
EW4S	2,631,400	2,649,650	2,631,400	2,661,030	0	11,380	0.00
EW5S	32,100	639,260	32,100	669,310	0	30,050	0.65
EW6S	4,612,300	733,880	4,612,300	837,700	0	103,820	2.25
EW7S	0	1,528,580	0	1,554,900	0	26,320	0.57
EW8S	1,033,000	127,370	1,033,000	148,680	0	21,310	0.46
EW9S	removed	85,760	removed	113,630	0	27,870	0.60
EW10S	7,181,000	7,228,630	7,181,000	7,228,630	0	0	0.00
EW11S	607,100	0	607,100	0	0	0	0.00
EW12S	1,559,200	106,810	1,559,200	137,010	0	30,200	0.66
EW13S	4,822,500	1,271,590	4,822,500	1,302,080	0	30,490	0.66
EW14S	removed	456,150	removed	456,150	0	0	0.00
EW15S	1,100	810,790	1,100	862,240	0	51,450	1.12
EW16S	8,349,700	8,349,130	8,349,700	8,508,280	0	159,150	3.45
EW17S	80,400	80,400	80,400	80,400	0	0	0.00
EW18S	5,288,600	0	5,288,600	2,510	0	2,510	0.05
EW19S	off	off	off	off	0	0	0.00
						572,740	12.18

Days 32
Minutes 46080

	2/27/2009	3/31/2009	Total Flow	GPM
PO-1			572,740	12.43

DATE	EW-1	EW-2	EW-3
3/31/2009	83675300	22384400	69786200
2/27/2009	81999500	19044000	66603600
Total Flow	1675800	3340400	3182600
GPM	36.37	72.49	69.07

	Air Stripper	
3/31/2009	113842767	
2/27/2009	104632133	
	9210634	GPM
Total Flow	9210634	199.88355

Apr-09

EXTRACTION WELL#	3/31/2009 OUTSIDE FLOW TOTALIZER	INSIDE FLOW TOTALIZER	5/1/2009 OUTSIDE FLOW TOTALIZER	INSIDE FLOW TOTALIZER	Outside Flow Totals	Inside Flow Totals	GPM
EW2S	2,584,300	3,086,310	2,584,300	3,142,800	0	56,490	1.27
EW3S	4,401,800	709,650	4,401,800	735,580	0	25,930	0.58
EW4S	2,631,400	2,661,030	2,723,900	2,720,390	92,500	59,360	2.07
EW5S	32,100	669,310	32,100	694,950	0	25,640	0.57
EW6S	4,612,300	837,700	4,612,300	880,570	0	42,870	0.96
EW7S	0	1,554,900	0	1,610,640	0	55,740	1.25
EW8S	1,033,000	148,680	1,033,000	179,640	0	30,960	0.69
EW9S	removed	0	removed	39,110	0	39,110	0.88
EW10S	7,181,000	7,228,630	7,181,000	7,228,630	0	0	0.00
EW11S	607,100	0	610,300	0	3,200	0	0.07
EW12S	1,559,200	137,010	1,559,200	155,500	0	18,490	0.41
EW13S	4,822,500	1,302,080	4,822,500	1,333,480	0	31,400	0.70
EW14S	removed	456,150	removed	456,150	0	0	0.00
EW15S	1,100	862,240	1,100	911,870	0	49,630	1.11
EW16S	8,349,700	8,508,280	8,673,300	8,672,850	323,600	164,570	7.25
EW17S	80,400	80,400	80,400	80,400	0	0	0.00
EW18S	5,288,600	2,510	5,288,600	46,800	0	44,290	0.00
EW19S	off	off	off	off	0	0	0.00
						647,680	17.82

	Days	31			
	Minutes	44640			
	3/31/2009		5/1/2009	Total Flow	GPM
PO-1				647,680	14.51

DATE	EW-1	EW-2	EW-3
5/1/2009	85551900	24903400	74979000
3/31/2009	83675300	22384400	69786200
Total Flow	1876600	2519000	5192800
GPM	42.04	56.43	116.33

	Air Stripper	
5/1/2009	24563108	
3/31/2009	13842767	
	10720341	GPM
Total Flow	10720341	240.151008

May-09

	5/1/2009		6/1/2009				
EXTRACTION WELL#	OUTSIDE FLOW TOTALIZER	INSIDE FLOW TOTALIZER	OUTSIDE FLOW TOTALIZER	INSIDE FLOW TOTALIZER	Outside Flow Totals	Inside Flow Totals	GPM
EW2S	2,584,300	3,142,800	2,584,300	3,170,710	0	27,910	0.63
EW3S	4,401,800	735,580	4,401,800	769,210	0	33,630	0.75
EW4S	2,723,900	2,720,390	2,723,900	2,801,790	0	81,400	0.00
EW5S	32,100	694,950	32,100	721,080	0	26,130	0.59
EW6S	4,612,300	880,570	4,612,300	919,120	0	38,550	0.86
EW7S	0	1,610,640	0	1,617,690	0	7,050	0.16
EW8S	1,033,000	179,640	1,033,000	217,770	0	38,130	0.85
EW9S	removed	39,110	removed	39,110	0	0	0.00
EW10S	7,181,000	7,228,630	7,181,000	7,228,630	0	0	0.00
EW11S	610,300	0	610,300	0	0	0	0.00
EW12S	1,559,200	0	1,559,200	14,800	0	14,800	0.33
EW13S	4,822,500	1,333,480	4,822,500	1,367,780	0	34,300	0.77
EW14S	removed	456,150	removed	456,150	0	0	0.00
EW15S	1,100	911,870	1,100	963,870	0	52,000	1.16
EW16S	8,673,300	8,672,850	8,673,300	8,847,780	0	174,930	0.00
EW17S	80,400	80,400	80,400	80,400	0	0	0.00
EW18S	5,288,600	46,800	5,288,600	103,690	0	56,890	0.00
EW19S	off	off	off	off	0	0	0.00
						585,720	6.10

	Days	31			
	Minutes	44640			
	5/1/2009		6/1/2009	Total Flow	GPM
PO-1				585,720	13.12

DATE	EW-1	EW-2	EW-3
6/1/2009	87407400	29442800	80137900
5/1/2009	85551900	24903400	74979000
Total Flow	1855500	4539400	5158900
GPM	41.57	101.69	115.57

	Air Stripper	
6/1/2009	37666444	
5/1/2009	24563108	
	13103336	GPM
Total Flow	13103336	293.533513

Jun-09

EXTRACTION WELL#	6/1/2009 OUTSIDE FLOW TOTALIZER	INSIDE FLOW TOTALIZER	6/30/2009 OUTSIDE FLOW TOTALIZER	INSIDE FLOW TOTALIZER	Outside Flow Totals	Inside Flow Totals	GPM
EW2S	2,584,300	3,170,710	2,584,300	3,189,600	0	18,890	0.45
EW3S	4,401,800	769,210	4,401,800	849,400	0	80,190	1.92
EW4S	2,723,900	2,801,790	2,723,900	2,889,490	0	87,700	0.00
EW5S	32,100	721,080	32,100	745,850	0	24,770	0.59
EW6S	4,612,300	919,120	4,612,300	953,540	0	34,420	0.82
EW7S	0	1,617,690	0	1,689,710	0	72,020	1.72
EW8S	1,033,000	217,770	1,033,000	251,420	0	33,650	0.81
EW9S	removed	39,110	removed	39,110	0	0	0.00
EW10S	7,181,000	7,228,630	7,181,000	7,228,630	0	0	0.00
EW11S	610,300	0	610,300	0	0	0	0.00
EW12S	1,559,200	14,800	1,559,200	16,060	0	1,260	0.03
EW13S	4,822,500	1,367,780	4,822,500	1,392,470	0	24,690	0.59
EW14S	removed	456,150	removed	456,150	0	0	0.00
EW15S	1,100	963,870	1,100	991,880	0	28,010	0.67
EW16S	8,673,300	8,847,780	8,673,300	9,014,060	0	166,280	0.00
EW17S	80,400	80,400	80,400	80,400	0	0	0.00
EW18S	5,288,600	103,690	5,288,600	154,010	0	50,320	0.00
EW19S	off	off	off	off	0	0	0.00
						622,200	7.61

	Days	29			
	Minutes	41760			
	6/1/2009		6/30/2009	Total Flow	GPM
PO-1				622,200	14.90

DATE	EW-1	EW-2	EW-3
6/30/2009	89122800	33650900	85045500
6/1/2009	87407400	29442800	80137900
Total Flow	1715400	4208100	4907600
GPM	41.08	100.77	117.52

	Air Stripper	
6/30/2009	49904661	
6/1/2009	37666444	
	12238217	GPM
Total Flow	12238217	293.060752

Jul-09

	6/30/2009		7/31/2009				
EXTRACTION WELL#	OUTSIDE FLOW TOTALIZER	INSIDE FLOW TOTALIZER	OUTSIDE FLOW TOTALIZER	INSIDE FLOW TOTALIZER	Outside Flow Totals	Inside Flow Totals	GPM
EW2S	2,584,300	3,189,600	2,584,300	3,189,600	0	0	0.00
EW3S	4,401,800	849,400	4,401,800	920,240	0	70,840	1.59
EW4S	2,723,900	2,889,490	2,723,900	2,966,400	0	76,910	0.00
EW5S	32,100	745,850	32,100	767,480	0	21,630	0.48
EW6S	4,612,300	953,540	4,612,300	990,860	0	37,320	0.84
EW7S	0	1,689,710	0	1,728,300	0	38,590	0.86
EW8S	1,033,000	251,420	1,033,000	285,160	0	33,740	0.76
EW9S	removed	39,110	removed	39,110	0	0	0.00
EW10S	7,181,000	7,228,630	7,181,000	7,228,630	0	0	0.00
EW11S	610,300	0	610,300	0	0	0	0.00
EW12S	1,559,200	16,060	1,559,200	16,060	0	0	0.00
EW13S	4,822,500	1,392,470	4,822,500	1,426,940	0	34,470	0.77
EW14S	removed	456,100	removed	456,100	0	0	0.00
EW15S	1,100	991,880	1,100	1,014,210	0	22,330	0.50
EW16S	8,673,300	9,014,060	8,673,300	9,186,500	0	172,440	0.00
EW17S	80,400	80,400	80,400	80,400	0	0	0.00
EW18S	5,288,600	154,010	5,288,600	209,100	0	55,090	0.00
EW19S	off	off	off	off	0	0	0.00
						563,360	5.80

	Days	31			
	Minutes	44640			
	6/30/2009		7/31/2009	Total Flow	GPM
PO-1				563,360	12.62

DATE	EW-1	EW-2	EW-3
7/31/2009	90735200	37937100	90043300
6/30/2009	89122800	33650900	85045500
Total Flow	1612400	4286200	4997800
GPM	36.12	96.02	111.96

	Air Stripper	
7/31/2009	61984844	
6/30/2009	49904661	
	12080183	GPM
Total Flow	12080183	270.613418

Aug-09

EXTRACTION WELL#	OUTSIDE FLOW TOTALIZER 7/31/2009	INSIDE FLOW TOTALIZER 7/31/2009	OUTSIDE FLOW TOTALIZER 8/31/2009	INSIDE FLOW TOTALIZER 8/31/2009	Outside Flow Totals	Inside Flow Totals	GPM
EW2S	2,584,300	3,189,600	2,584,300	3,189,600	0	0	0.00
EW3S	4,401,800	920,240	4,401,800	981,020	0	60,780	1.36
EW4S	2,723,900	2,966,400	2,723,900	3,023,740	0	57,340	0.00
EW5S	32,100	767,480	32,100	810,120	0	42,640	0.96
EW6S	4,612,300	990,860	4,612,300	1,034,150	0	43,290	0.97
EW7S	0	1,728,300	0	1,760,620	0	32,320	0.72
EW8S	1,033,000	285,160	1,033,000	317,590	0	32,430	0.73
EW9S	removed	39,110	removed	39,110	0	0	0.00
EW10S	7,181,000	7,228,630	7,181,000	7,228,630	0	0	0.00
EW11S	610,300	0	610,300	0	0	0	0.00
EW12S	1,559,200	16,060	1,559,200	16,060	0	0	0.00
EW13S	4,822,500	1,426,940	4,822,500	1,462,990	0	36,050	0.81
EW14S	removed	456,100	removed	456,100	0	0	0.00
EW15S	1,100	1,014,210	1,100	1,064,390	0	50,180	1.12
EW16S	8,673,300	9,186,500	8,673,300	9,376,340	0	189,840	0.00
EW17S	80,400	80,400	80,400	80,400	0	0	0.00
EW18S	5,288,600	209,100	5,288,600	310,820	0	101,720	0.00
EW19S	off	off	off	off	0	0	0.00
						646,590	6.67

	Days	31			
	Minutes	44640			
	7/31/2009		8/31/2009	Total Flow	GPM
PO-1				646,590	14.48

DATE	EW-1	EW-2	EW-3
8/31/2009	91991800	42100100	95361400
7/31/2009	90735200	37937100	90043300
Total Flow	1256600	4163000	5318100
GPM	28.15	93.26	119.13

	Air Stripper	
8/31/2009	73978480	
7/31/2009	61984844	
	11993636	GPM
Total Flow	11993636	268.674642

Sep-09

	8/31/2009		9/30/2009				
EXTRACTION WELL#	OUTSIDE FLOW TOTALIZER	INSIDE FLOW TOTALIZER	OUTSIDE FLOW TOTALIZER	INSIDE FLOW TOTALIZER	Outside Flow Totals	Inside Flow Totals	GPM
EW2S	2,584,300	3,189,600	2,584,300	3,209,820	0	20,220	0.47
EW3S	4,401,800	981,020	4,401,800	1,056,180	0	75,160	1.74
EW4S	2,723,900	3,023,740	2,723,900	3,080,790	0	57,050	1.32
EW5S	32,100	810,120	32,100	861,020	0	50,900	1.18
EW6S	4,612,300	1,034,150	4,612,300	1,076,310	0	42,160	0.98
EW7S	0	1,760,620	0	1,830,370	0	69,750	1.61
EW8S	1,033,000	317,590	1,033,000	348,390	0	30,800	0.71
EW9S	removed	39,110	removed	39,110	0	0	0.00
EW10S	7,181,000	7,228,630	7,181,000	7,228,630	0	0	0.00
EW11S	610,300	0	610,300	0	0	0	0.00
EW12S	1,559,200	16,060	1,559,200	16,060	0	0	0.00
EW13S	4,822,500	1,462,990	4,822,500	1,498,610	0	35,620	0.82
EW14S	removed	456,100	removed	456,100	0	0	0.00
EW15S	1,100	1,064,390	1,100	1,157,000	0	92,610	2.14
EW16S	8,673,300	9,376,340	8,673,300	9,536,140	0	159,800	3.70
EW17S	80,400	80,400	80,400	80,400	0	0	0.00
EW18S	5,288,600	310,820	5,288,600	421,110	0	110,290	2.55
EW19S	off	off	off	off	0	0	0.00
						744,360	17.23

	Days	30			
	Minutes	43200			
	8/31/2009		9/30/2009	Total Flow	GPM
PO-1				744,360	17.23

DATE	EW-1	EW-2	EW-3
9/30/2009	93746300	46061900	100492400
8/31/2009	91991800	42100100	95361400
Total Flow	1754500	3961800	5131000
GPM	40.61	91.71	118.77

	Air Stripper	
9/30/2009	86265757	
8/31/2009	73978480	
	12287277	GPM
Total Flow	12287277	284.427708

Oct-09

EXTRACTION WELL#	9/30/2009 OUTSIDE FLOW TOTALIZER	9/30/2009 INSIDE FLOW TOTALIZER	10/30/2009 OUTSIDE FLOW TOTALIZER	10/30/2009 INSIDE FLOW TOTALIZER	Outside Flow Totals	Inside Flow Totals	GPM
EW2S	2,584,300	3,209,820	2,584,300	3,286,890	0	77,070	1.78
EW3S	4,401,800	1,056,180	4,401,800	1,082,830	0	26,650	0.62
EW4S	2,723,900	3,080,790	2,723,900	3,139,500	0	58,710	1.36
EW5S	32,100	861,020	32,100	906,330	0	45,310	1.05
EW6S	4,612,300	1,076,310	4,612,300	1,088,820	0	12,510	0.29
EW7S	0	1,830,370	0	1,892,700	0	62,330	1.44
EW8S	1,033,000	348,390	1,033,000	357,270	0	8,880	0.21
EW9S	removed	39,110	removed	39,110	0	0	0.00
EW10S	7,181,000	7,228,630	7,181,000	7,228,630	0	0	0.00
EW11S	610,300	0	610,300	0	0	0	0.00
EW12S	1,559,200	16,060	1,559,200	30,450	0	14,390	0.33
EW13S	4,822,500	1,498,610	4,822,500	1,509,790	0	11,180	0.26
EW14S	removed	456,100	removed	456,100	0	0	0.00
EW15S	1,100	1,157,000	1,100	1,235,170	0	78,170	1.81
EW16S	8,673,300	9,536,140	8,673,300	9,662,120	0	125,980	2.92
EW17S	80,400	80,400	80,400	80,400	0	0	0.00
EW18S	5,288,600	421,110	5,288,600	501,020	0	79,910	1.85
EW19S	off	off	off	off	0	0	0.00
						601,090	13.91

	Days	30			
	Minutes	43200			
	9/30/2009		10/30/2009	**Total Flow**	**GPM**
PO-1				601,090	13.91

DATE	**EW-1**	**EW-2**	**EW-3**	
10/30/2009	95250200	49345300	104910000	Next month 4910000
9/30/2009	93746300	46061900	100492400	
Total Flow	1503900	3283400	4417600	
GPM	34.81	76.00	102.26	

	Air Stripper	
10/30/2009	96747610	
9/30/2009	86265757	
	10481853	**GPM**
Total Flow	10481853	242.635486

Nov-09

	10/30/2009		12/1/2009				
EXTRACTION WELL#	OUTSIDE FLOW TOTALIZER	INSIDE FLOW TOTALIZER	OUTSIDE FLOW TOTALIZER	INSIDE FLOW TOTALIZER	Outside Flow Totals	Inside Flow Totals	GPM
EW2S	2,584,300	3,286,890	2,584,300	3,312,190	0	25,300	0.55
EW3S	4,401,800	1,082,830	4,401,800	1,289,140	0	206,310	4.48
EW4S	2,723,900	3,139,500	2,723,900	3,316,580	0	177,080	3.84
EW5S	32,100	906,330	32,100	969,710	0	63,380	1.38
EW6S	4,612,300	1,088,820	4,612,300	1,088,820	0	0	0.00
EW7S	0	1,892,700	0	1,974,700	0	82,000	1.78
EW8S	1,033,000	357,270	1,033,000	449,140	0	91,870	1.99
EW9S	removed	39,110	removed	39,110	0	0	0.00
EW10S	7,181,000	7,228,630	7,181,000	7,228,630	0	0	0.00
EW11S	610,300	0	610,300	0	0	0	0.00
EW12S	1,559,200	30,450	1,559,200	30,450	0	0	0.00
EW13S	4,822,500	1,509,790	4,822,500	1,554,330	0	44,540	0.97
EW14S	removed	456,100	removed	456,100	0	0	0.00
EW15S	1,100	1,235,170	1,100	1,325,700	0	90,530	1.96
EW16S	8,673,300	9,662,120	8,673,300	9,662,297	0	177	0.00
EW17S	80,400	80,400	80,400	80,400	0	0	0.00
EW18S	5,288,600	501,020	5,288,600	548,860	0	47,840	1.04
EW19S	off	off	off	off	0	0	0.00
						829,027	17.99

	Days	32			
	Minutes	46080			
	10/30/2009		12/1/2009	Total Flow	GPM
PO-1				829,027	17.99

DATE	EW-1	EW-2	EW-3	
12/1/2009	97076000	53219000	10417000	Next month 4910000
10/30/2009	95250200	49345300	4910000	
Total Flow	1825800	3873700	5507000	
GPM	39.62	84.06	119.51	

	Air Stripper	
12/1/2009	109942068	
10/30/2009	96747610	
	13194458	GPM
Total Flow	13194458	286.338064

Dec-09

EXTRACTION WELL#	OUTSIDE FLOW TOTALIZER 12/1/2009	INSIDE FLOW TOTALIZER 12/1/2009	OUTSIDE FLOW TOTALIZER 12/31/2009	INSIDE FLOW TOTALIZER 12/31/2009	Outside Flow Totals	Inside Flow Totals	GPM
EW2S	2,584,300	3,312,190	2,584,300	3,423,160	0	110,970	2.57
EW3S	4,401,800	1,289,140	4,401,800	1,388,630	0	99,490	2.30
EW4S	2,723,900	3,316,580	2,723,900	3,498,120	0	181,540	4.20
EW5S	32,100	969,710	32,100	1,030,950	0	61,240	1.42
EW6S	4,612,300	1,088,820	4,612,300	1,088,820	0	0	0.00
EW7S	0	1,974,700	0	2,054,060	0	79,360	1.84
EW8S	1,033,000	449,140	1,033,000	532,120	0	82,980	1.92
EW9S	removed	39,110	removed	39,110	0	0	0.00
EW10S	7,181,000	7,228,630	7,181,000	7,228,630	0	0	0.00
EW11S	610,300	0	610,300	0	0	0	0.00
EW12S	1,559,200	30,450	1,559,200	30,450	0	0	0.00
EW13S	4,822,500	1,554,330	4,822,500	1,591,240	0	36,910	0.85
EW14S	removed	456,100	removed	456,100	0	0	0.00
EW15S	1,100	1,325,700	1,100	1,441,650	0	115,950	2.68
EW16S	8,673,300	9,662,297	8,673,300	10,071,400	0	409,103	9.47
EW17S	80,400	80,400	80,400	80,400	0	0	0.00
EW18S	5,288,600	548,860	5,288,600	677,500	0	128,640	2.98
EW19S	off	off	off	off	0	0	0.00
						1,306,183	30.24

	Days	30			
	Minutes	43200			
	12/1/2009		12/31/2009	Total Flow	GPM
PO-1				1,306,183	30.24

DATE	EW-1	EW-2	EW-3
12/31/2009	98792200	56718400	15629900
12/1/2009	97076000	53219000	10417000
Total Flow	1716200	3499400	5212900
GPM	39.73	81.00	120.67

	Air Stripper	
12/31/2009	122268888	
12/1/2009	109942068	
	12326820	GPM
Total Flow	12326820	285.343056

Jan-10

EXTRACTION WELL#	OUTSIDE FLOW TOTALIZER 12/31/2009	INSIDE FLOW TOTALIZER 12/31/2009	OUTSIDE FLOW TOTALIZER 2/1/2010	INSIDE FLOW TOTALIZER 2/1/2010	Outside Flow Totals	Inside Flow Totals	GPM
EW2S	2,584,300	3,423,160	2,584,300	3,538,970	0	115,810	2.51
EW3S	4,401,800	1,388,630	4,401,800	1,486,520	0	97,890	2.12
EW4S	2,723,900	3,498,120	2,723,900	3,620,070	0	121,950	2.65
EW5S	32,100	1,030,950	32,100	1,097,080	0	66,130	1.44
EW6S	4,612,300	1,088,820	4,612,300	1,088,820	0	0	0.00
EW7S	0	2,054,060	0	2,140,860	0	86,800	1.88
EW8S	1,033,000	532,120	1,033,000	618,989	0	86,869	1.89
EW9S	removed	39,110	removed	39,110	0	0	0.00
EW10S	7,181,000	7,228,630	7,181,000	7,228,630	0	0	0.00
EW11S	610,300	0	610,300	0	0	0	0.00
EW12S	1,559,200	30,450	1,559,200	30,490	0	40	0.00
EW13S	4,822,500	1,591,240	4,822,500	1,633,950	0	42,710	0.93
EW14S	removed	456,100	removed	456,100	0	0	0.00
EW15S	1,100	1,441,650	1,100	1,550,680	0	109,030	2.37
EW16S	8,673,300	71,400	8,673,300	273,720	0	202,320	4.39
EW17S	80,400	80,400	80,400	80,400	0	0	0.00
EW18S	5,288,600	677,500	5,288,600	819,970	0	142,470	3.09
EW19S	off	off	off	off	0	0	0.00
						1,072,019	23.26

Days 32
Minutes 46080

	12/31/2009	2/1/2010	Total Flow	GPM
PO-1			1,072,019	23.26

DATE	EW-1	EW-2	EW-3
2/1/2010	100608200	59096700	20783700
12/31/2009	98792200	56718400	15629900
Total Flow	1816000	2378300	5153800
GPM	39.41	51.61	111.84

	Air Stripper	
2/1/2010	33327600	
12/31/2009	22268888	
	11058712	GPM
Total Flow	11058712	239.98941

Feb-10

EXTRACTION WELL#	1/31/2010 OUTSIDE FLOW TOTALIZER	INSIDE FLOW TOTALIZER	3/1/2010 OUTSIDE FLOW TOTALIZER	INSIDE FLOW TOTALIZER	Outside Flow Totals	Inside Flow Totals	GPM
EW2S	2,584,300	3,538,970	2,584,300	3,664,230	0	125,260	3.00
EW3S	4,401,800	1,486,520	4,401,800	1,579,460	0	92,940	2.23
EW4S	2,723,900	3,620,070	2,723,900	3,896,670	0	276,600	6.62
EW5S	32,100	1,097,080	32,100	1,138,740	0	41,660	1.00
EW6S	4,612,300	0	4,612,300	43,390	0	43,390	1.04
EW7S	0	2,140,860	0	2,218,290	0	77,430	1.85
EW8S	1,033,000	618,989	1,033,000	683,420	0	64,431	1.54
EW9S	removed	39,110	removed	39,110	0	0	0.00
EW10S	7,181,000	7,228,630	7,181,000	7,228,630	0	0	0.00
EW11S	610,300	0	610,300	0	0	0	0.00
EW12S	1,559,200	30,490	1,559,200	30,490	0	0	0.00
EW13S	4,822,500	1,633,950	4,822,500	1,675,230	0	41,280	0.99
EW14S	removed	456,100	removed	456,100	0	0	0.00
EW15S	1,100	1,550,680	1,100	1,642,500	0	91,820	2.20
EW16S	8,673,300	273,720	8,673,300	457,540	0	183,820	4.40
EW17S	80,400	80,400	80,400	80,400	0	0	0.00
EW18S	5,288,600	819,970	5,288,600	940,160	0	120,190	2.88
EW19S	off	off	off	off	0	0	0.00
						1,158,821	27.75

	Days	29			
	Minutes	41760			
	1/31/2010		3/1/2010	Total Flow	GPM
PO-1				1,158,821	27.75

DATE	EW-1	EW-2	EW-3
3/1/2010	2192400	61123000	25234200
2/1/2010	608200	59096700	20783700
Total Flow	1584200	2026300	4450500
GPM	37.94	48.52	106.57

	Air Stripper	
3/1/2010	43525591	
2/1/2010	33327600	
	10197991	GPM
Total Flow	10197991	244.204765

Mar-10

EXTRACTION WELL#	3/1/2010 OUTSIDE FLOW TOTALIZER	3/1/2010 INSIDE FLOW TOTALIZER	3/31/2010 OUTSIDE FLOW TOTALIZER	3/31/2010 INSIDE FLOW TOTALIZER	Outside Flow Totals	Inside Flow Totals	GPM
EW2S	2,584,300	3,664,230	2,584,300	3,801,340	0	137,110	3.17
EW3S	4,401,800	1,579,460	4,401,800	1,679,620	0	100,160	2.32
EW4S	2,723,900	3,896,670	2,723,900	4,093,510	0	196,840	4.56
EW5S	32,100	1,138,740	32,100	1,142,550	0	3,810	0.09
EW6S	4,612,300	43,390	4,612,300	94,310	0	50,920	1.18
EW7S	0	2,218,290	0	2,303,980	0	85,690	1.98
EW8S	1,033,000	683,420	1,033,000	734,630	0	51,210	1.19
EW9S	removed	39,110	removed	39,110	0	0	0.00
EW10S	7,181,000	7,228,630	7,181,000	7,228,630	0	0	0.00
EW11S	610,300	0	610,300	0	0	0	0.00
EW12S	1,559,200	30,490	1,559,200	30,490	0	0	0.00
EW13S	4,822,500	1,675,230	4,822,500	1,718,620	0	43,390	1.00
EW14S	removed	456,100	removed	456,100	0	0	0.00
EW15S	1,100	1,642,500	1,100	1,745,770	0	103,270	2.39
EW16S	8,673,300	457,540	8,673,300	656,980	0	199,440	4.62
EW17S	80,400	80,400	80,400	80,400	0	0	0.00
EW18S	5,288,600	940,160	5,288,600	1,069,860	0	129,700	3.00
EW19S	off	off	off	off	0	0	0.00
						1,101,540	25.50

	Days	30			
	Minutes	43200			
	3/1/2010		3/31/2010	Total Flow	GPM
PO-1				1,101,540	25.50

DATE	EW-1	EW-2	EW-3
3/31/2010	3967500	63279000	26218700
3/1/2010	2192400	61123000	25234200
Total Flow	1775100	2156000	984500
GPM	41.09	49.91	22.79

	Air Stripper	
3/31/2010	50134250	
3/1/2010	43525591	
	6608659	GPM
Total Flow	6608659	152.978218

Apr-10

EXTRACTION WELL#	3/31/2010 OUTSIDE FLOW TOTALIZER	INSIDE FLOW TOTALIZER	4/30/2010 OUTSIDE FLOW TOTALIZER	INSIDE FLOW TOTALIZER	Outside Flow Totals	Inside Flow Totals	GPM
EW2S	2,584,300	3,801,340	2,584,300	3,924,810	0	123,470	2.86
EW3S	4,401,800	1,679,620	4,401,800	1,772,290	0	92,670	2.15
EW4S	2,723,900	4,093,510	2,723,900	4,256,000	0	162,490	3.76
EW5S	32,100	1,142,550	32,100	1,142,550	0	0	0.00
EW6S	4,612,300	94,310	4,612,300	94,320	0	10	0.00
EW7S	0	2,303,980	0	2,379,120	0	75,140	1.74
EW8S	1,033,000	734,630	1,033,000	778,580	0	43,950	1.02
EW9S	removed	39,110	removed	39,110	0	0	0.00
EW10S	7,181,000	7,228,630	7,181,000	7,228,630	0	0	0.00
EW11S	610,300	0	610,300	0	0	0	0.00
EW12S	1,559,200	30,490	1,559,200	30,490	0	0	0.00
EW13S	4,822,500	1,718,620	4,822,500	1,761,930	0	43,310	1.00
EW14S	removed	456,100	removed	456,100	0	0	0.00
EW15S	1,100	1,745,770	1,100	1,842,350	0	96,580	2.24
EW16S	8,673,300	656,980	8,673,300	851,090	0	194,110	4.49
EW17S	80,400	80,400	80,400	80,400	0	0	0.00
EW18S	5,288,600	1,069,860	5,288,600	1,120,650	0	50,790	1.18
EW19S	off	off	off	off	0	0	0.00
						882,520	20.43

	Days	30			
	Minutes	43200			
	3/31/2010		4/30/2010	**Total Flow**	**GPM**
PO-1				882,520	20.43

DATE	EW-1	EW-2	EW-3
4/30/2010	5947800	65602900	26218700
3/31/2010	3967500	63279000	26218700
Total Flow	1980300	2323900	0
GPM	45.84	53.79	0.00

	Air Stripper	
4/30/2010	56310097	
3/31/2010	50134250	
	6175847	**GPM**
Total Flow	6175847	142.959421

May-10

EXTRACTION WELL#	OUTSIDE FLOW TOTALIZER (4/30/2010)	INSIDE FLOW TOTALIZER (4/30/2010)	OUTSIDE FLOW TOTALIZER (6/1/2010)	INSIDE FLOW TOTALIZER (6/1/2010)	Outside Flow Totals	Inside Flow Totals	GPM
EW2S	2,584,300	3,924,810	2,584,300	4,074,180	0	149,370	3.24
EW3S	4,401,800	1,772,290	4,401,800	1,888,720	0	116,430	2.53
EW4S	2,723,900	4,256,000	2,723,900	4,441,510	0	185,510	4.03
EW5S	32,100	1,142,550	32,100	1,142,550	0	0	0.00
EW6S	4,612,300	94,320	4,612,300	94,320	0	0	0.00
EW7S	0	2,379,120	0	2,477,880	0	98,760	2.14
EW8S	1,033,000	778,580	1,033,000	824,000	0	45,420	0.99
EW9S	removed	39,110	removed	39,110	0	0	0.00
EW10S	7,181,000	7,228,630	7,181,000	7,228,630	0	0	0.00
EW11S	610,300	0	610,300	0	0	0	0.00
EW12S	1,559,200	30,490	1,559,200	30,490	0	0	0.00
EW13S	4,822,500	1,761,930	4,822,500	1,813,380	0	51,450	1.12
EW14S	removed	456,100	removed	456,100	0	0	0.00
EW15S	1,100	1,842,350	1,100	1,963,870	0	121,520	2.64
EW16S	8,673,300	851,090	8,673,300	950,990	0	99,900	2.17
EW17S	80,400	80,400	80,400	80,400	0	0	0.00
EW18S	5,288,600	1,120,650	5,288,600	1,278,100	0	157,450	3.42
EW19S	off	off	off	off	0	0	0.00
						1,025,810	22.26

	Days	32			
	Minutes	46080			
	4/30/2010		6/1/2010	Total Flow	GPM
PO-1				1,025,810	22.26

DATE	EW-1	EW-2	EW-3
6/1/2010	7657700	67553900	2603700
4/30/2010	5947800	65602900	0
Total Flow	1709900	1951000	2603700
GPM	37.11	42.34	56.50

	Air Stripper	
6/1/2010	63920999	
4/30/2010	56310097	
	7610902	GPM
Total Flow	7610902	165.167144

Jun-10

	6/1/2010		6/30/2010				
EXTRACTION WELL#	OUTSIDE FLOW TOTALIZER	INSIDE FLOW TOTALIZER	OUTSIDE FLOW TOTALIZER	INSIDE FLOW TOTALIZER	Outside Flow Totals	Inside Flow Totals	GPM
EW2S	2,584,300	4,074,180	2,584,300	4,186,650	0	112,470	2.69
EW3S	4,401,800	1,888,720	4,401,800	1,993,860	0	105,140	2.52
EW4S	2,723,900	4,441,510	2,723,900	4,608,310	0	166,800	3.99
EW5S	32,100	1,142,550	32,100	1,155,560	0	13,010	0.31
EW6S	4,612,300	0	4,612,300	6,740	0	6,740	0.16
EW7S	0	2,477,880	0	2,621,640	0	143,760	3.44
EW8S	1,033,000	824,000	1,033,000	867,140	0	43,140	1.03
EW9S	removed	39,110	removed	39,110	0	0	0.00
EW10S	7,181,000	7,228,630	7,181,000	7,228,630	0	0	0.00
EW11S	610,300	0	610,300	0	0	0	0.00
EW12S	1,559,200	30,490	1,559,200	44,420	0	13,930	0.33
EW13S	4,822,500	1,813,380	4,822,500	1,833,270	0	19,890	0.48
EW14S	removed	456,100	removed	456,100	0	0	0.00
EW15S	1,100	1,963,870	1,100	2,070,270	0	106,400	2.55
EW16S	8,673,300	950,990	8,673,300	1,142,800	0	191,810	4.59
EW17S	80,400	80,400	80,400	80,400	0	0	0.00
EW18S	5,288,600	1,278,100	5,288,600	1,433,890	0	155,790	3.73
EW19S	off	off	off	off	0	0	0.00
						1,078,880	25.84

	Days	29			
	Minutes	41760			
	6/1/2010		6/30/2010	Total Flow	GPM
PO-1				1,078,880	25.84

DATE	EW-1	EW-2	EW-3
6/30/2010	9388900	69380000	8016000
6/1/2010	7657700	67553900	2603700
Total Flow	1731200	1826100	5412300
GPM	41.46	43.73	129.60

	Air Stripper	
6/30/2010	74360967	
6/1/2010	63920999	
	10439968	GPM
Total Flow	10439968	249.999234

Jul-10

EXTRACTION WELL#	OUTSIDE FLOW TOTALIZER (6/30/2010)	INSIDE FLOW TOTALIZER (6/30/2010)	OUTSIDE FLOW TOTALIZER (7/30/2010)	INSIDE FLOW TOTALIZER (7/30/2010)	Outside Flow Totals	Inside Flow Totals	GPM
EW2S	2,584,300	0	2,584,300	34,480	0	51,820	1.20
EW3S	4,401,800	1,993,860	4,401,800	2,100,490	0	106,630	2.47
EW4S	2,723,900	4,608,310	2,723,900	4,703,550	0	95,240	2.20
EW5S	32,100	1,155,560	32,100	1,216,490	0	60,930	1.41
EW6S	4,612,300	6,740	4,612,300	213,260	0	206,520	4.78
EW7S	0	2,621,640	0	2,756,550	0	134,910	3.12
EW8S	1,033,000	0	1,033,000	91,550	0	91,550	2.12
EW9S	removed	0	removed	61,230	0	61,230	1.42
[redacted]							0.23
							0.17
EW12S	1,559,200	44,420	1,559,200	62,270	0	17,850	0.41
EW13S	4,822,500	0	4,822,500	65,760	0	65,760	1.52
EW14S	removed	456,100	removed	456,100	0	0	0.00
EW15S	1,100	2,070,270	1,100	2,172,970	0	102,700	2.38
EW16S	8,673,300	1,142,800	8,673,300	1,308,970	0	166,170	3.85
EW17S	80,400	80,400	80,400	80,400	0	0	0.00
EW18S	5,288,600	1,433,890	5,288,600	1,533,250	0	99,360	2.30
EW19S	off	off	off	off	0	0	0.00
						1,278,070	29.58

	Days	30			
	Minutes	43200			
	6/30/2010		7/30/2010	**Total Flow**	**GPM**
PO-1				1,278,070	29.58

DATE	EW-1	EW-2	EW-3
7/30/2010	11037800	71019900	13244500
6/30/2010	9388900	69380000	8016000
Total Flow	1648900	1639900	5228500
GPM	38.17	37.96	121.03

	Air Stripper	
7/30/2010	84543818	
6/30/2010	74360967	
	10182851	**GPM**
Total Flow	10182851	235.714144

Aug-10

	7/30/2010		8/31/2010				
EXTRACTION WELL#	OUTSIDE FLOW TOTALIZER	INSIDE FLOW TOTALIZER	OUTSIDE FLOW TOTALIZER	INSIDE FLOW TOTALIZER	Outside Flow Totals	Inside Flow Totals	GPM
EW2S	2,584,300	34,480	2,584,300	83,880	0	49,400	1.11
EW3S	4,401,800	2,100,490	4,401,800	2,162,190	0	61,700	1.38
EW4S	2,723,900	4,703,550	2,723,900	4,753,880	0	50,330	1.13
EW5S	32,100	1,216,490	32,100	1,253,640	0	37,150	0.83
EW6S	4,612,300	213,260	4,612,300	350,880	0	137,620	3.08
EW7S	0	2,756,550	0	2,845,010	0	88,460	1.98
EW8S	1,033,000	910,550	1,033,000	910,550	0	0	0.00
EW9S	removed	61,230	removed	66,260	0	5,030	0.11
EW10S	7,181,000	7,238,530	7,181,000	7,238,950	0	420	0.01
EW11S	610,300	7,500	610,300	61,870	0	54,370	1.22
EW12S	1,559,200	62,270	1,559,200	396,670	0	334,400	7.49
EW13S	4,822,500	65,760	4,822,500	124,710	0	58,950	1.32
EW14S	removed	456,100	removed	456,100	0	0	0.00
EW15S	1,100	2,172,970	1,100	2,239,620	0	66,650	1.49
EW16S	8,673,300	1,308,970	8,673,300	1,416,780	0	107,810	2.42
EW17S	80,400	80,400	80,400	80,400	0	0	0.00
EW18S	5,288,600	1,533,250	5,288,600	1,607,770	0	74,520	1.67
EW19S	off	off	off	off	0	0	0.00
						1,126,810	25.24

	Days	31			
	Minutes	44640			
	7/30/2010		8/30/2010	Total Flow	GPM
PO-1				1,126,810	25.24

DATE	EW-1	EW-2	EW-3
8/30/2010	12304800	72281100	17237700
7/30/2010	11037800	71019900	13244500
Total Flow	1267000	1261200	3993200
GPM	28.38	28.25	89.45

	Air Stripper	
8/30/2010	92138955	
7/30/2010	84543818	
	7595137	GPM
Total Flow	7595137	170.141958

Sep-10

EXTRACTION WELL#	OUTSIDE FLOW TOTALIZER 8/30/2010	INSIDE FLOW TOTALIZER 8/30/2010	OUTSIDE FLOW TOTALIZER 9/30/2010	INSIDE FLOW TOTALIZER 9/30/2010	Outside Flow Totals	Inside Flow Totals	GPM
EW2S	2,584,300	83,880	2,584,300	163,920	0	80,040	1.79
EW3S	4,401,800	2,162,190	4,401,800	2,268,420	0	106,230	2.38
EW4S	2,723,900	4,753,880	2,723,900	4,799,510	0	45,630	1.02
EW5S	32,100	1,253,640	32,100	1,357,370	0	103,730	2.32
EW6S	4,612,300	350,880	4,612,300	576,680	0	225,800	5.06
EW7S	0	2,845,010	0	2,966,580	0	121,570	2.72
EW8S	1,033,000	910,550	1,033,000	910,590	0	40	0.00
EW9S	removed	66,260	removed	117,620	0	51,360	1.15
EW10S	7,181,000	7,238,950	7,181,000	7,238,950	0	0	0.00
EW11S	610,300	61,870	610,300	123,180	0	61,310	1.37
EW12S	1,559,200	396,670	1,559,200	621,150	0	224,480	5.03
EW13S	4,822,500	124,710	4,822,500	124,710	0	0	0.00
EW14S	removed	456,100	removed	456,100	0	0	0.00
EW15S	1,100	2,239,620	1,100	2,292,390	0	52,770	1.18
EW16S	8,673,300	1,416,780	8,673,300	1,569,140	0	152,360	3.41
EW17S	80,400	80,400	80,400	80,400	0	0	0.00
EW18S	5,288,600	1,607,770	5,288,600	1,675,140	0	67,370	1.51
EW19S	off	off	off	off	0	0	0.00
						1,292,690	28.96

	Days	31			
	Minutes	44640			
	8/30/2010		9/30/2010	**Total Flow**	**GPM**
PO-1				1,292,690	28.96

DATE	**EW-1**	**EW-2**	**EW-3**
9/30/2010	14073700	73967500	22903100
8/30/2010	12304800	72281100	17237700
Total Flow	1768900	1686400	5665400
GPM	39.63	37.78	126.91

	Air Stripper	
9/30/2010	102843755	
8/30/2010	92138955	
	10704800	**GPM**
Total Flow	10704800	239.802867

Oct-10

EXTRACTION WELL#	OUTSIDE FLOW TOTALIZER 9/30/2010	INSIDE FLOW TOTALIZER 9/30/2010	OUTSIDE FLOW TOTALIZER 11/1/2010	INSIDE FLOW TOTALIZER 11/1/2010	Outside Flow Totals	Inside Flow Totals	GPM
EW2S	2,584,300	163,920	2,584,300	233,930	0	70,010	1.52
EW3S	4,401,800	2,268,420	4,401,800	2,346,260	0	77,840	1.69
EW4S	2,723,900	4,799,510	2,723,900	4,838,720	0	39,210	0.85
EW5S	32,100	1,357,370	32,100	1,438,160	0	80,790	1.75
EW6S	4,612,300	576,680	4,612,300	777,810	0	201,130	4.36
EW7S	0	2,966,580	0	3,059,270	0	92,690	2.01
EW8S	1,033,000	910,590	1,033,000	910,590	0	0	0.00
EW9S	removed	117,620	removed	255,540	0	137,920	2.99
EW10S	7,181,000	7,238,950	7,181,000	7,239,000	0	50	0.00
EW11S	610,300	123,180	610,300	206,720	0	83,540	1.81
EW12S	1,559,200	621,150	1,559,200	813,890	0	192,740	4.18
EW13S	4,822,500	124,710	4,822,500	124,710	0	0	0.00
EW14S	removed	456,100	removed	456,100	0	0	0.00
EW15S	1,100	2,292,390	1,100	2,374,240	0	81,850	1.78
EW16S	8,673,300	1,569,140	8,673,300	1,693,820	0	124,680	2.71
EW17S	80,400	80,400	80,400	80,400	0	0	0.00
EW18S	5,288,600	1,675,140	5,288,600	1,762,090	0	86,950	1.89
EW19S	off	off	off	off	0	0	0.00
						1,269,400	27.55

	Days	32			
	Minutes	46080			
	9/30/2010		11/1/2010	**Total Flow**	**GPM**
PO-1				1,269,400	27.55

DATE	**EW-1**	**EW-2**	**EW-3**
11/1/2010	15610400	75424200	27886200
9/30/2010	14073700	73967500	22903100
Total Flow	1536700	1456700	4983100
GPM	33.35	31.61	108.14

	Air Stripper	
11/1/2010	112227629	
9/30/2010	102843755	
	9383874	**GPM**
Total Flow	9383874	203.643099

Nov-10

EXTRACTION WELL#	11/1/2010 OUTSIDE FLOW TOTALIZER	11/1/2010 INSIDE FLOW TOTALIZER	11/30/2010 OUTSIDE FLOW TOTALIZER	11/30/2010 INSIDE FLOW TOTALIZER	Outside Flow Totals	Inside Flow Totals	GPM
EW2S	2,584,300	233,930	2,584,300	307,090	0	73,160	1.75
EW3S	4,401,800	2,346,260	4,401,800	2,417,210	0	70,950	1.70
EW4S	2,723,900	4,838,720	2,723,900	4,859,850	0	21,130	0.51
EW5S	32,100	1,438,160	32,100	1,502,020	0	63,860	1.53
EW6S	4,612,300	777,810	4,612,300	993,220	0	215,410	5.16
EW7S	0	3,059,270	0	3,181,430	0	122,160	2.93
EW8S	1,033,000	0	1,033,000	17,940	0	17,940	0.43
EW9S	removed	255,540	removed	336,240	0	80,700	1.93
EW10S	7,181,000	7,239,000	7,181,000	7,239,500	0	500	0.01
EW11S	610,300	206,720	610,300	299,990	0	93,270	2.23
EW12S	1,559,200	813,890	1,559,200	1,018,140	0	204,250	4.89
EW13S	4,822,500	124,710	4,822,500	124,710	0	0	0.00
EW14S	removed	456,100	removed	456,100	0	0	0.00
EW15S	1,100	2,374,240	1,100	2,455,940	0	81,700	1.96
EW16S	8,673,300	1,693,820	8,673,300	1,836,910	0	143,090	3.43
EW17S	80,400	80,400	80,400	80,400	0	0	0.00
EW18S	5,288,600	1,762,090	5,288,600	1,852,270	0	90,180	2.16
EW19S	off	off	off	off	0	0	0.00
						1,278,300	30.61

	Days	29			
	Minutes	41760			
	11/1/2010		11/30/2010	Total Flow	GPM
PO-1				1,278,300	30.61

DATE	EW-1	EW-2	EW-3
11/30/2010	17238300	77049600	33271500
11/1/2010	15610400	75424200	27886200
Total Flow	1627900	1625400	5385300
GPM	38.98	38.92	128.96

	Air Stripper	
11/30/2010	22282822	
11/1/2010	12227629	
	10055193	GPM
Total Flow	10055193	240.785273

Dec-10

EXTRACTION WELL#	11/30/2010 OUTSIDE FLOW TOTALIZER	INSIDE FLOW TOTALIZER	12/30/2010 OUTSIDE FLOW TOTALIZER	INSIDE FLOW TOTALIZER	Outside Flow Totals	Inside Flow Totals	GPM
EW2S	2,584,300	307,090	2,584,300	376,330	0	69,240	1.60
EW3S	4,401,800	2,417,210	4,401,800	2,475,550	0	58,340	1.35
EW4S	2,723,900	4,859,850	2,723,900	4,875,250	0	15,400	0.36
EW5S	32,100	1,502,020	32,100	1,567,440	0	65,420	1.51
EW6S	4,612,300	993,220	4,612,300	1,198,390	0	205,170	4.75
EW7S	0	3,181,430	0	3,249,600	0	68,170	1.58
EW8S	1,033,000	17,940	1,033,000	54,980	0	37,040	0.86
EW9S	removed	336,240	removed	365,120	0	28,880	0.67
EW10S	7,181,000	7,239,500	7,181,000	7,239,500	0	0	0.00
EW11S	610,300	299,990	610,300	387,690	0	87,700	2.03
EW12S	1,559,200	1,018,140	1,559,200	1,207,000	0	188,860	4.37
EW13S	4,822,500	124,710	4,822,500	126,070	0	1,360	0.03
EW14S	removed	456,100	removed	456,100	0	0	0.00
EW15S	1,100	2,455,940	1,100	2,536,540	0	80,600	1.87
EW16S	8,673,300	1,836,910	8,673,300	1,962,850	0	125,940	2.92
EW17S	80,400	80,400	80,400	80,400	0	0	0.00
EW18S	5,288,600	1,852,270	5,288,600	1,921,520	0	69,250	1.60
EW19S	off	off	off	off	0	0	0.00
						1,101,370	25.49

	Days	30			
	Minutes	43200			
	11/30/2010		12/30/2010	Total Flow	GPM
PO-1				1,101,370	25.49

DATE	EW-1	EW-2	EW-3
12/30/2010	18854200	78665600	38678000
11/30/2010	17238300	77049600	33271500
Total Flow	1615900	1616000	5406500
GPM	37.41	37.41	125.15

	Air Stripper	
11/30/2010	32122950	
11/30/2010	22282822	
	9840128	GPM
Total Flow	9840128	227.780741

Jan-11

EXTRACTION WELL#	12/30/2010 OUTSIDE FLOW TOTALIZER	12/30/2010 INSIDE FLOW TOTALIZER	1/31/2011 OUTSIDE FLOW TOTALIZER	1/31/2011 INSIDE FLOW TOTALIZER	Outside Flow Totals	Inside Flow Totals	GPM
EW2S	2,584,300	376,330	2,584,300	451,130	0	74,800	1.62
EW3S	4,401,800	2,475,550	4,401,800	2,530,680	0	55,130	1.20
EW4S	2,723,900	4,875,250	2,723,900	4,883,220	0	7,970	0.17
EW5S	32,100	1,567,440	32,100	1,647,640	0	80,200	1.74
EW6S	4,612,300	1,198,390	4,612,300	1,419,220	0	220,830	4.79
EW7S	0	3,249,600	0	3,350,450	0	100,850	2.19
EW8S	1,033,000	54,980	1,033,000	63,320	0	8,340	0.18
EW9S	removed	365,120	removed	483,700	0	118,580	2.57
EW10S	7,181,000	7,239,500	7,181,000	7,239,500	0	0	0.00
EW11S	610,300	387,690	610,300	483,540	0	95,850	2.08
EW12S	1,559,200	1,207,000	1,559,200	1,406,220	0	199,220	4.32
EW13S	4,822,500	126,070	4,822,500	126,070	0	0	0.00
EW14S	removed	456,100	removed	456,100	0	0	0.00
EW15S	1,100	2,536,540	1,100	2,632,370	0	95,830	2.08
EW16S	8,673,300	1,962,850	8,673,300	2,106,320	0	143,470	3.11
EW17S	80,400	80,400	80,400	80,400	0	0	0.00
EW18S	5,288,600	1,921,520	5,288,600	1,993,360	0	71,840	1.56
EW19S	off	off	off	off	0	0	0.00
						1,272,910	27.62

Days 32
Minutes 46080

	12/30/2010	1/31/2011	Total Flow	GPM
PO-1			1,272,910	27.62

DATE	EW-1	EW-2	EW-3
1/31/2011	20533400	80355400	44237200
12/30/2010	18854200	78665600	38678000
Total Flow	1679200	1689800	5559200
GPM	36.44	36.67	120.64

	Air Stripper	
1/31/2011	42180218	
12/30/2010	32122950	
	10057268	GPM
Total Flow	10057268	218.256684

AREA D REMEDIATION SYSTEM PUMPING RATES

FEBRUARY 1995 – JUNE 2006 and FEBRUARY 2009 – DECEMBER 2010

AREA D REMEDIATION SYSTEM PUMPING RATES

FEBRUARY 1995 – JUNE 2006

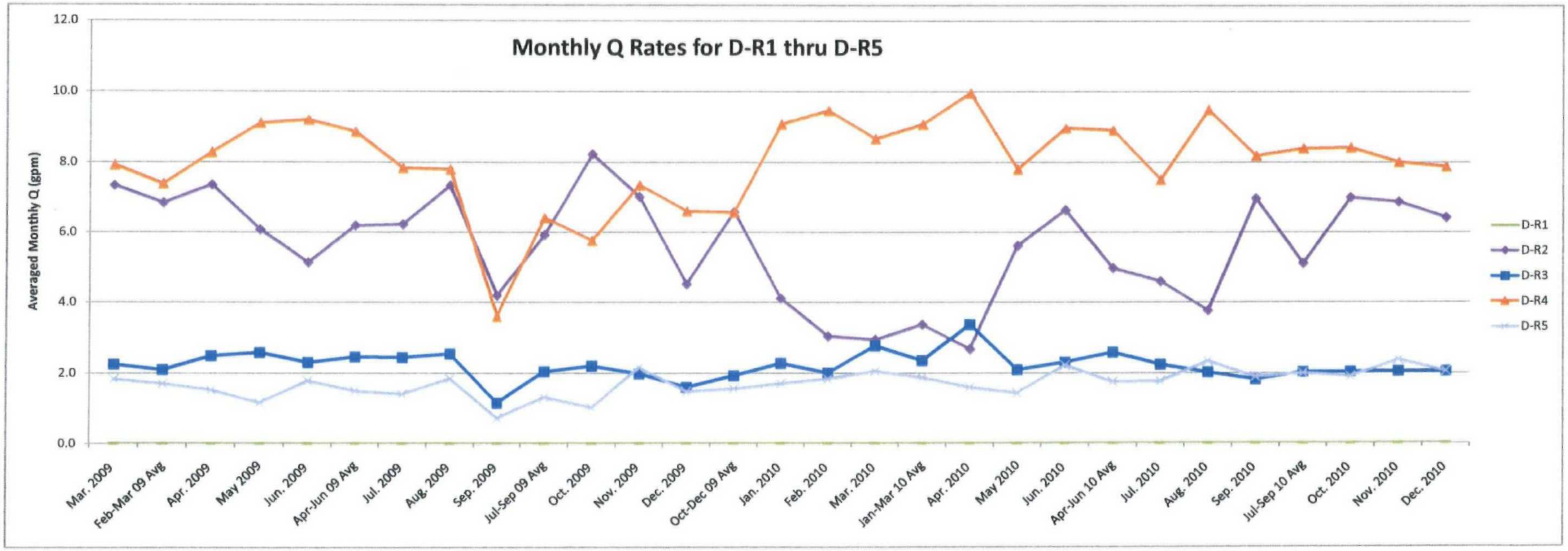
DATE	AVERAGE PUMPING RATES	NOTES
2/95 – 3/95	36 gpm	Full-time operation of system began
4/95 – 9/95	49 gpm	
10/95 – 9/98	34 gpm	
10/98 – 12/98	25 gpm	
1/99 – 3/2004	40 gpm	
4/2004 – 6/2004	53 gpm	
7/2004	51 gpm	
8/2004	56 gpm	
9/2004	33 gpm	
10/2004	42 gpm	
11/2004	40 gpm	
12/2004	43 gpm	
2/2005		Increased flow rate to provide hydraulic recapture of plume
5/2005	74 gpm	
6/2005	80 gpm	
7/2005	86 gpm	
8/2005	78 gpm	
10/2005	62 gpm	
11/2005	54 gpm	
12/2005	67 gpm	
2/2006	69 gpm	2.3 million gallons went to Area 41 injection wells as test; 0.5 million gallons went to Area D infiltration galleries
3/2006	76 gpm	
4/2006	58 gpm	
6/2006	55 gpm	

During this period, all of the treated effluent was piped out to the Area D infiltration galleries and/or sprinkler system except for the Area 41 injection well test period during February 2006.

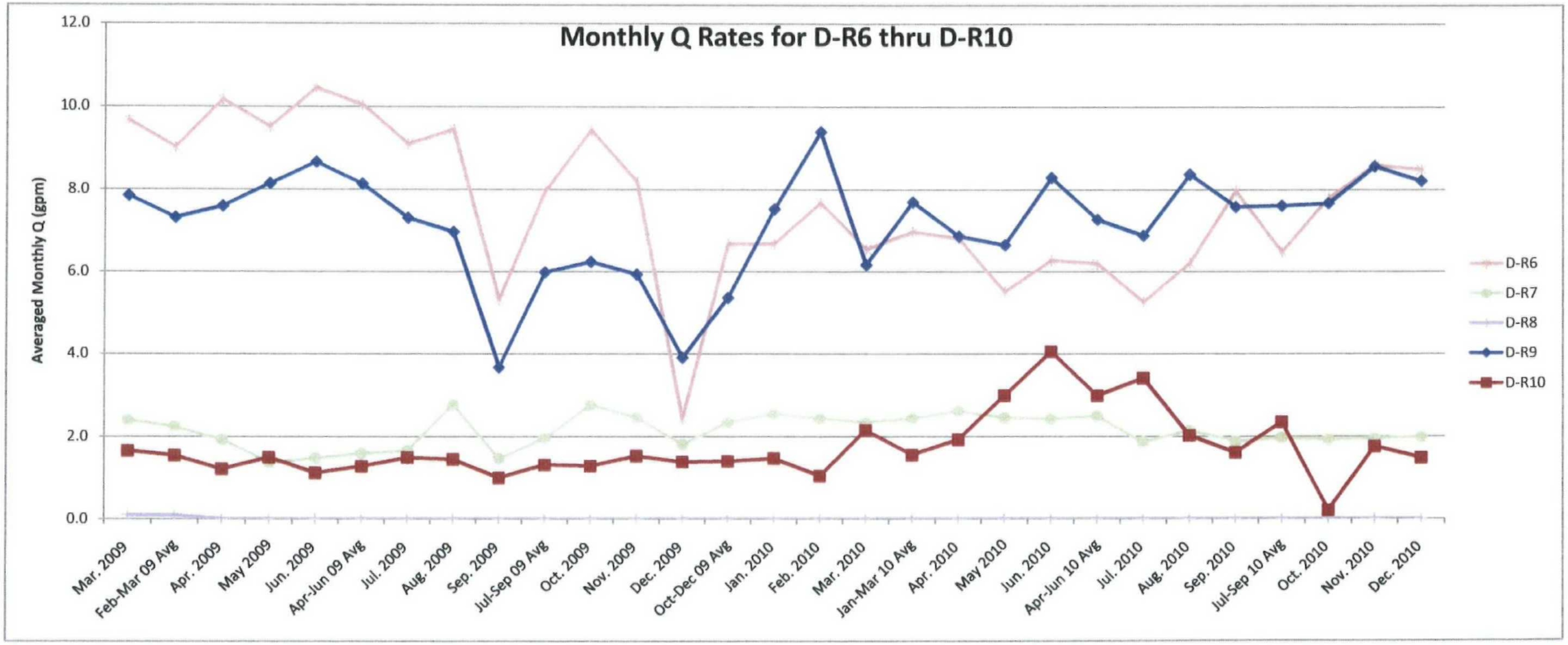
AREA D REMEDIATION SYSTEM PUMPING RATES
FEBRUARY 2009 - DECEMBER 2010

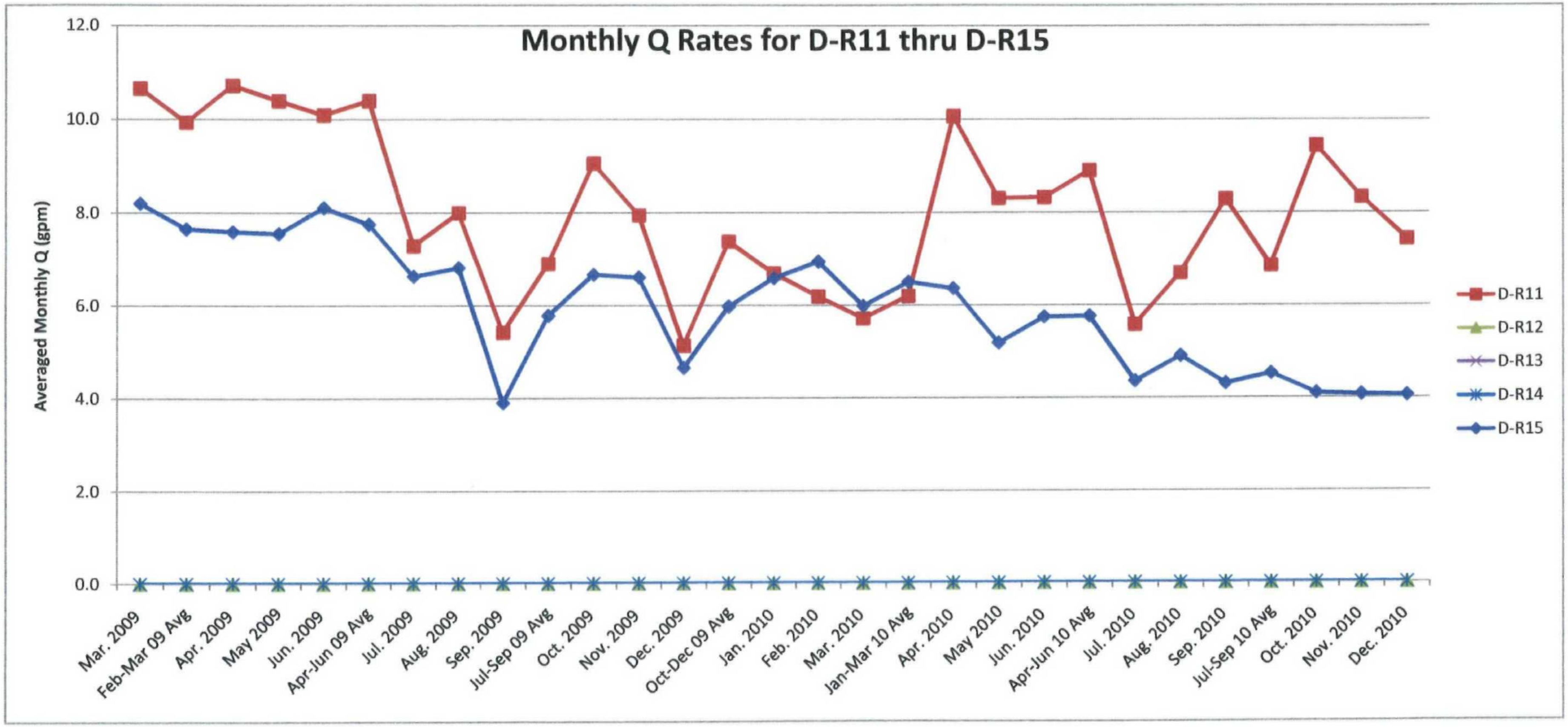
	Feb-Mar 09 Avg	Apr-Jun 09 Avg	Jul-Sep 09 Avg	Oct-Dec 09 Avg	Jan-Mar 10 Avg	Apr-Jun 10 Avg	Jul-Sep 10 Avg	Oct-Dec 10 Avg
D-R1	0.00	0	0	0.00	0.00	0.00	0.00	0.00
D-R2	1315.23	1189.298	1137.371	1265.54	645.80	955.44	980.83	1299.17
D-R3	402.91	471.8941	392.5482	369.42	451.44	496.68	388.75	392.76
D-R4	1419.43	1703.004	1232.386	1263.13	1743.57	1712.64	1612.59	1556.53
D-R5	326.49	285.8383	253.5894	298.18	357.88	335.53	384.16	405.86
D-R6	1733.19	1930.996	1529.036	1284.73	1339.83	1190.73	1245.38	1595.47
D-R7	430.69	307.1858	377.2586	450.12	468.57	479.44	377.30	374.95
D-R8	17.37	0	0	0.00	0.00	0.00	0.00	0.00
D-R9	1407.86	1565.577	1150.991	1030.45	1480.11	1398.31	1463.99	1567.66
D-R10	296.97	245.7652	253.1478	269.98	299.80	574.75	451.25	219.93
D-R11	1910.33	1999.902	1327.243	1418.99	1192.38	1712.18	1318.07	1615.39
D-R12	0.00	0	0	0.00	0.00	0.00	0.00	0.00
D-R13	0.00	0	0	0.00	0.00	0.00	0.00	0.00
D-R14	0.00	0	0	0.00	0.00	0.00	0.00	0.00
D-R15	1471.53	1491.344	1111.732	1148.37	1251.08	1107.79	868.31	782.34

	Totals 2010				Rate	2010
	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Avg 2010	Ratios
D-R1	0	0	0	0	0	0
D-R2	58121.91	86945.19	90235.93	119524.1	972.1291	0.102071
D-R3	40629.92	45197.66	35764.68	36133.48	432.1253	0.045372
D-R4	156921.6	155850.5	148358.4	143200.9	1655.702	0.173844
D-R5	32208.93	30533.19	35342.56	37338.9	371.0235	0.038956
D-R6	120584.4	108356.7	114574.8	146782.9	1343.284	0.141041
D-R7	42171.47	43628.62	34711.6	34495.14	424.6762	0.04459
D-R8	0	0	0	0	0	0
D-R9	133210.2	127246.1	134686.8	144224.8	1477.72	0.155157
D-R10	26982.16	52301.98	41515.03	20233.2	386.39	0.04057
D-R11	107313.9	155808.4	121262.7	148616.1	1460.277	0.153325
D-R12	0	0	0	0	0	0
D-R13	0	0	0	0	0	0
D-R14	0	0	0	0	0	0
D-R15	112597.2	100809.1	79884.79	71974.96	1000.729	0.105074
				Total	9524.057	
				gpm	49.47562	



Monthly Q Rates for D-R1 thru D-R5
Averaged Monthly Q (gpm)
12.0
10.0
8.0
6.0
4.0
2.0
0.0
D-R1
D-R2
D-R3
D-R4
D-R5
Mar. 2009
Feb-Mar 09 Avg
Apr. 2009
May 2009
Jun. 2009
Apr-Jun 09 Avg
Jul. 2009
Aug. 2009
Sep. 2009
Jul-Sep 09 Avg
Oct. 2009
Nov. 2009
Dec. 2009
Oct-Dec 09 Avg
Jan. 2010
Feb. 2010
Mar. 2010
Jan-Mar 10 Avg
Apr. 2010
May 2010
Jun. 2010
Apr-Jun 10 Avg
Jul. 2010
Aug. 2010
Sep. 2010
Jul-Sep 10 Avg
Oct. 2010
Nov. 2010
Dec. 2010


Monthly Q Rates for D-R6 thru D-R10
Averaged Monthly Q (gpm)
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Mar. 2009
Feb-Mar 09 Avg
Apr. 2009
May 2009
Jun. 2009
Apr-Jun 09 Avg
Jul. 2009
Aug. 2009
Sep. 2009
Jul-Sep 09 Avg
Oct. 2009
Nov. 2009
Dec. 2009
Oct-Dec 09 Avg
Jan. 2010
Feb. 2010
Mar. 2010
Jan-Mar 10 Avg
Apr. 2010
May 2010
Jun. 2010
Apr-Jun 10 Avg
Jul. 2010
Aug. 2010
Sep. 2010
Jul-Sep 10 Avg
Oct. 2010
Nov. 2010
Dec. 2010
D-R6
D-R7
D-R8
D-R9
D-R10


Monthly Q Rates for D-R11 thru D-R15
Averaged Monthly Q (gpm)
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Mar. 2009
Feb-Mar 09 Avg
Apr. 2009
May 2009
Jun. 2009
Apr-Jun 09 Avg
Jul. 2009
Aug. 2009
Sep. 2009
Jul-Sep 09 Avg
Oct. 2009
Nov. 2009
Dec. 2009
Oct-Dec 09 Avg
Jan. 2010
Feb. 2010
Mar. 2010
Jan-Mar 10 Avg
Apr. 2010
May 2010
Jun. 2010
Apr-Jun 10 Avg
Jul. 2010
Aug. 2010
Sep. 2010
Jul-Sep 10 Avg
Oct. 2010
Nov. 2010
Dec. 2010
D-R11
D-R12
D-R13
D-R14
D-R15